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HISTORY OF THE ORGANIC RADICALS.

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A Lecture delivered before the Chemical Society of Paris, March 30th, 1860.

Translated from the French, by W. S. W. RUSCHENBERGER, M. D., U. S. N.

Gentlemen: I propose to set forth in a summary manner in this lecture the history of organic radicals, the study of which, though dating back scarcely thirty years, has produced fruitful results, and contributed largely to the development of organic chemistry.

We give the name of radicals to particular compounds, whose complex nature may be rendered evident by the aid of physical forces, or by the intervention of reagents; but which, though formed of many elements, present the characters of simple bodies and exercise functions precisely similar. They are, in a word, compounds, which possess the property of forming with simple bodies, combinations entirely analogous to those which the latter produce by their mutual union.

Among the radicals some are known in the isolated state; these may be handled and made to combine and to separate under influences which enable us to make and unmake chemical compounds of most varied character, such as cyanogen, cacodyl, stibethyl, &c.; but the greatest number, it must be admitted, have only a purely hypothetical existence. Among the latter are methyl, ethyl, acetyl, benzöile, ammonium, &c.

By grouping the different organic compounds into families or determinate series of which each includes a fixed nucleus or radical, a kind of pivot around which all bodies of the group turn, their study has been considerably simplified, rendering them both more advantageous and philosophic. Thus in the

alcohol derived from wine, the ether of pharmacy, and the different compound ethers, chemists have admitted the existence of a fixed group,



analogous to potassium, although up to the present time we have been unable to isolate a product presenting this composition, which would be capable of forming ordinary ether by its direct union with oxygen, or of engendering chlorohydric ether, by combining it with chlorine. By causing zinc to act on iodohydric ether in closed vessels at a temperature of from 140° to 150° [centigrade,] M. Frankland separated iodine in the state of a metallic iodide, and was enabled to collect a compound gas formed of 4 eq. of carbon+5 eq. of hydrogen.

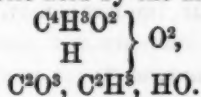
But this, the formula of which it is necessary to double in order to place its equivalent in harmony with those of all well defined compounds, although offering us in reality the composition of the product designated under the name of ethyl, presents none of the characters which a radical should possess.

Placed in the presence of chlorine, far from reproducing chlorohydric ether, as we should expect, it furnishes, as is observed in different hydrogenous compounds, a product derived by substitution. Oxygen, in whatever condition it may be made to intervene, will not effect its conversion into ordinary ether. I would say as much of the product obtained in treating benzine by chlorine, a compound which Laurent considered as the radical of benzoic combinations, as the true benzöile, as well as of the other isomeric, the formation of which has been indicated in the dry distillation of the benzoate of copper.

If then we study attentively these diverse groupings which have been regarded as radicals, we shall not be slow to perceive that only a very small number of them satisfy the conditions, which similar products ought to satisfy, namely: to beget by their union with certain simple bodies clearly definite compounds, from which they might be afterwards separated perfectly intact. If we see certain groupings, which we suppose to constitute the nucleus of a given substance, pass into the numerous compounds it is susceptible of forming, or into different derivatives which contact with reagents may produce, that is not sufficient evidently to range them in this group of bodies; such are

ethyl, benzöile, &c., of which we spoke before. Certainly the study of all these bodies is most instructive, and it will not be denied that to the profound examination of these questions, organic chemistry is indebted for the great strides it has made in latter years, so much have observers multiplied experiments to elucidate them; nevertheless, it seems to me more suitable in the actual state of science, to consider as radicals only those singular substances, which, taken in a pure state, behave in the manner of simple bodies.

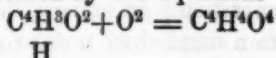
Such definite grouping appears to us most frequently as a radical, only according to the particular view we take, or according to the metamorphoses determined by the reagent we employ. Thus if we consider the formation of acetic acid by the oxidation of alcohol, or, better, of aldehyd, we are led to regard this product as the oxide of a ternary radical which we designate under the name of acetyl, but if we base our view upon the decomposition which this same acid undergoes on the part of alkaline bases, at elevated temperatures or on the separation which electrolysis effects in it, we are naturally brought to trace its derivation to the reciprocal action of carbonic acid, and the grouping C^2H^4 , which is nothing but marsh gas. From this we might express the constitution of acetic acid by the aid of the formulæ,



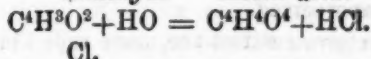
both of which satisfy clearly definite reactions.

It is now known that acetic acid may be produced, either by the direct oxidation of aldehyd, or the decomposition of the chloride of acetyl by water, or by the contact of carbonic acid with *kalimethyl* or *natrimethyl*.

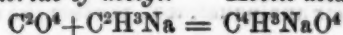
It is what is expressed by the equations



Aldehyd. Acetic acid.



Chloride of acetyl. Acetic acid.

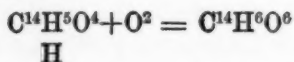


Natrimethyl. Acetate of soda.

It would be the same with all the acids of the acetic group.

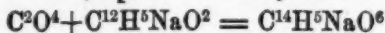
Now, whatever may be the veritable constitution of these different acids, of which we are entirely ignorant in the present state of science, there remains no less knowledge of them, on account of the close analogies which connect these bodies to each other; if we had just discovered the real constitution of one of them, we should easily understand that of others, and there is consequently a very great advantage in arranging them in the same series, a knowledge of all flowing from that of a single one.

I would say as much of salicylic acid and its homologues, this acid being as readily obtainable by the oxidation of the oil of spiræa as by the action of carbonic acid upon the phenate of sodium. In fact, we have



H

Oil of spiræa. Salicylic acid.



Phenate of sodium. Salicylate of soda.

In place, then, of regarding aldehyde and oil of spiræa as hydrurets of ternary radicals, acetyl and salicyl, which we have been unable to seize, and, consequently, acetic and salicylic acids as oxides of these radicals, is it not more simple to consider them, with M. Dumas, as types in which we may, by the aid of double decompositions, effect a series of regular substitutions, without destroying their equilibrium, without modifying their mechanical grouping. We find ourselves in this way brought back to the equivalent compositions of M. Chevreul, which, prejudging nothing, permits the observer to try such reaction as may appear to him realizable from his point of view; these equivalent compositions presenting besides the great advantage of offering us a register by which to verify our analyses or permitting us to seize upon relations which without them would remain unperceived.

We will, therefore, restrict the name radical to compound bodies which, taken in the free state, such as cyanogen, cacodyl, stibethyl, and their analogues, &c., possess the characters of true simple bodies playing sometimes the part of an electro-negative

element or supporter of combustion, sometimes that of an electro-positive element or combustible.

I propose to examine only those in this lecture, not that I think that some of these hypothetical bodies may not be isolated at some future time, but because it appears to me more suitable to consider such only as it is possible to obtain in a free state.

This stated, I will now endeavor to demonstrate the simple idea I entertain of the part played by these curious bodies, however singular it may appear at first, and which seems to me to be naturally derived from the law of chemical combinations.

If we place in presence of each other two elements, endowed with a mutual affinity in greater or less degree, they will be evidently attracted one towards the other, and will give rise to compounds the most diverse, manifesting certain physical phenomena, such as the development of electricity, of heat, and sometimes of light, the intensity of which will depend upon their degree of affinity. Be this as it may, these bodies are incapable of uniting in all imaginable proportions, and daily experience demonstrates in the most evident manner that in this contact, however varied may be the circumstances under which it is effected, they can never form but a very limited number of combinations. If the affinities which solicit these bodies are very energetic, they form at most two or three compounds, most commonly only one, and these always oppose great resistance to decomposition. The manner in which hydrogen and the alkaline metals behave with chlorine; the products which result from the contact of charcoal, of boron, of silicium, &c., with oxygen at high temperatures, demonstrate it sufficiently. On the contrary, bodies which have little tendency to unite when placed in presence of each other, form numerous, but always unstable compounds. To enable us to be understood, we think it is enough to refer to the history of the oxygenated compounds of chlorine.

In every case, whatever may be the number of compounds which two simple bodies may be susceptible of forming by their mutual union, there is always one which possesses greater stability than the others, and towards which they all converge.

But the greater or less stability of such group is evidently only relative to the special circumstances under which its formation is effected. Hence, whenever we place in very determinate conditions the different compounds which two bodies have produced by their mutual union, they constantly assume the particular form which is alone possible in these conditions. We all know, for example, that of all the compounds which phosphorus is susceptible of forming with oxygen, the most stable is phosphoric acid. Under special influences phosphorus may be united to this gas in other proportions, but all these different compounds converge towards this group under the influence of high temperature. Acted upon in the presence of free oxygen, there will be a fixation of a certain quantity of this gas. Acted upon in closed vessels, there will be a separation of a certain quantity of phosphorus. In all cases, whenever phosphorus does not assimilate the proportion of oxygen necessary for its transformation into phosphoric acid, it may be always brought back to this form, or substituted in place of a portion of this oxygen, other simple bodies, such as of chlorine, bromine, sulphur, &c., so as to produce the compounds known under the names of chloroxide, bromoxide, and sulfoxide of phosphorus, which, the same as phosphoric acid, belong to the group



In a word, when we place in presence of each other two simple bodies, susceptible of uniting under determinate conditions, and of giving rise to many definite compounds, we observe that there always exists a state of saturation which possesses an equilibrium that it is impossible to exceed. As long as this state of equilibrium is not attained, we may add to the first body a new proportion of the second until saturation is effected.

There are certain bodies which, by uniting with another, yield very stable products which, not having reached the point of saturation, have a tendency to combination quite as great and sometimes even more energetic than the simple bodies themselves. Such are carbon, sulphur, and nitrogen; oxide of carbon, sulphurous acid and binoxide of nitrogen, being susceptible not only of absorbing new quantities of oxygen with greater facility than the simple bodies which they contain, but of also

uniting with chlorine and iodine, to form compounds corresponding to those which are at the maximum of oxygenation. These very stable groups, which may be made to enter into definite compounds, to be afterwards separated from them without undergoing the slightest alteration, and those alone which thus present the fundamental properties of simple bodies, truly merit the name of radicals.

We may easily conceive the sensation produced by the discovery of cyanogen, which, so long as it is not altered in its elementary constitution, presents in a faithful manner the most prominent properties of chlorine and its congeners. We can now give a very clear account of the remarkable functions of cyanogen in setting out from combinations with nitrogen.

Every compound may be considered as a molecular system in equilibrium in which the atoms are attracted towards each other in virtue of more or less powerful affinities. If we replace one or more atoms of one of the elements of the compound by an equal number of atoms of another substance, we obtain a new compound which will present the same mechanical grouping as the primitive product, but whose state of equilibrium within extended limits, is accordingly as the reciprocal attractions of the bodies which constitute the new substance shall be more or less energetic than those of the primitive bodies. Ammonia being susceptible of exchanging all or part of its hydrogen for chlorine, bromine, iodine, carbon, cyanogen, ethyl, the metals, &c., should necessarily form, by means of these substitutions compounds belonging to the same system, but presenting the most diverse conditions of equilibrium; this is demonstrated in the most evident manner by experience.

It is thus that although ammonia resists a dull red heat, we clearly understand that chloride of nitrogen may be instantly destroyed, not only by the effect of temperatures below the boiling point of water, but under the influence of the slightest disturbance, the affinities which solicit chlorine and nitrogen being incomparably weaker than those which unite the latter to hydrogen.

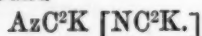
If now we remove an atom from the primitive group without replacing it, and if the new combination which results from this elimination presents a certain stability, it may fix anew the atom

of the substance eliminated, to reproduce the primitive body or an atom of any other simple body to produce compounds of the same type; the compound formed under these circumstances will act from that moment as a true radical. Let us pass a current of dry ammoniacal gas over charcoal arranged in a porcelain tube brought to a red heat, two atoms of hydrogen will be eliminated, two atoms of carbon will take their place, and we shall obtain cyanhydric acid, a compound the grouping of which corresponds to that of ammonia, but whose properties are very different, as may be readily conceived, the chemical functions of carbon being very different from those of hydrogen.

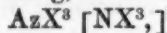
By its reaction upon the oxides of mercury or silver, cyanhydric acid thus produced will give rise to the formation of cyanurets which will not differ from it except that the molecule of hydrogen will be found replaced in it by a molecule of metal, silver or mercury, but the fundamental characters will be still evidently the same. If we now subject these cyanurets to the action of increasing temperatures, a moment will soon arrive when equilibrium is no longer possible, and we shall see a separation into a metal which will remain as residue in the distillatory apparatus, and a gas, the composition of which is expressed by the formula.



This gas is no other than cyanogen, which to enter into the ammonia type has but to *fix* an atom of different simple bodies, playing in respect to them sometimes the part of an electro-positive element, as in cyanic acid and chloride of cyanogen, and sometimes the part of an electro-negative as in cyanhydric acid and the cyanurets. This cyanogen which just now could not exist in combination with mercury or silver at a dull red heat, on account of its feeble affinity for those bodies, when heated under a bell glass with potassium, manifests vivid ignition, giving rise to the compound



belonging, like the preceding, to the type



but this time capable of resisting very high temperatures. If cyanogen thus perfectly simulates the characters of a true simple body, it is evidently due on the one hand to its considerable

stability, and on the other to its tendency to produce combinations at the maximum of saturation which are themselves very stable, by assimilating a molecule of some simple body to enter again into the primitive type from which it was derived. The part of cyanogen as a radical, as a body acting in the character of an element, is so explained in a most satisfactory manner; we shall see that the same is true of various products known under the name of radicals.

When we place a simple body, metal or metalloid, in presence of oxygen, it forms with this gas, as we have seen, definite compounds in various numbers; replace the oxygen by chlorine, bromine, sulphur, &c., and we beget compounds represented by parallel formulæ; now experience shows, that adopting suitable processes we can form with this same body and methyl, or any one of its homologues, products whose composition is entirely comparable. Methyl or its homologues united to electro-negative bodies which are at the top of the scale of simple bodies, (oxygen, chlorine, bromine, iodine, &c.,) yield very stable compounds, which possess perfect neutrality. In proportion as we descend the scale, and advance towards potassium which forms the lowest point of it, we obtain products whose affinity for simple bodies which occupy its superior extremity goes on increasing to such a point that, when it reaches the group of alkaline metals, there is a dislocation of the molecule and formation of very simple and consequently very stable products.

If we unite methyl with the intermediate bodies we shall obtain compounds that still possess a great affinity for oxygen, chlorine, &c., and consequently capable of forming with these bodies clearly definite compounds whose stability is such that they may be completely separated from them intact. In this way may be produced bodies comparable to cyanogen, at least as long as the proportion of methyl or of ethyl which enters into the composition of these products represents the term of saturation, in which case, it is believed, the molecule is entirely inapt to enter into combination.

When a simple body A forms with another simple body B, several compounds, whose term of saturation is represented by the formula

AB x .

(x being a whole number always very simple,) experience demonstrates that we may form with this body A and the different alcoholic radicals compounds at different states of saturation. As long as the number of molecules of the alcoholic radical which enters into the compound is inferior to x , the new compound can be united to oxygen, to chlorine, to iodine, &c.; if it is also susceptible of separating intact from these combinations under the influence of agents endowed with preponderating affinities for these simple bodies, it will behave as a true radical, being able to absorb a greater number of atoms of oxygen or of chlorine in proportion as the number of equivalents of ethyl which it may contain shall be smaller. Experience teaches in like manner that, in proportion as the number of equivalents of the alcoholic radical which unites with A goes on increasing, the resulting compound is endowed with affinities for oxygen, chlorine, &c., more and more energetic, the oxygenated compounds, however acid or neutral they were primitively, advancing towards alkalinity in the most decided manner.

Arsenic presents us in this respect a most striking and instructive example. This body tends to form two principal groups,

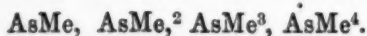


and

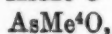
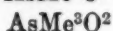
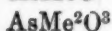


the last presenting the term of saturation.

We may then form with arsenic and methyl at a maximum five definite compounds, the last being incapable of producing new compounds, because it is at saturation. Now, the experiments of Bunsen, of Landolt, of Baeyer and my own, demonstrate that we may form with arsenic and methyl the four compounds



If we place these different compounds in presence of an excess of oxygen so as to obtain compounds at saturation we shall have



which form with water the following compounds :

$\text{AsMeO}^4 2\text{HO}$ bibasic acid,

$\text{AsMe}^2\text{O}^3\text{HO}$ monobasic acid,

AsMe^3O^2 indifferent body,

$\text{AsMe}^4\text{O}, \text{HO}$ powerful base, comparable to potassa and soda.

The oxygenated compound which forms the superior term presenting the characters of a very energetic acid, we see that the last possesses such alkalinity that it may rival the most powerful bases.

Azote [nitrogen,] like arsenic, is susceptible of giving origin to five perfectly definite groups which may be formulized in the following manner :



These five groups which are of the greatest interest may be realized with oxygen. We are also acquainted with compounds containing both oxygen and other elements, such as chloronitrous and chloronitric acids which may be obtained by the direct union of chlorine with binoxide of azote [nitrogen] compounds which correspond to nitrous and hyponitric acids.

Contrary to what is observed with oxygen we have been able to isolate but a single definite hydrogenated compound of azote [nitrogen.]

This compound, which is ammonia



corresponds to the group



We have previously seen how we may, starting from this product, produce the most diverse compounds by a series of regular substitutions. Ammonia, being endowed with basic properties, will beget bases by these substitutions, if we replace a part or all of its hydrogen by bodies whose chemical functions are analogous, while it will yield neutral bodies and even acids if we replace this hydrogen by bodies whose chemical functions are opposite.

Substitute, for example, in place of the hydrogen any one of

the radicals of the divers alcoholic series, phenyl or one of its homologues, &c., we obtain products which present not only the most complete parallelism of composition, but whose chemical characters are so confounded with those of ammonia, that the history of these various compounds is deduced from that of the substance itself. This result is easily explained when we reflect that the chemical functions of these carburets of hydrogen much resemble those of hydrogen; but what is very worthy of attention is that the alkalinity of these compounds increases with the number of equivalents of methyl, of ethyl, &c., which have been substituted. This observation becomes more striking still when we consider the compounds resulting from similar substitutions effected in phosphuretted hydrogen.



The trimethylphosphine PhMe^3

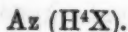
and the triethylphosphine PhE^3 ,

which differ as we see from this gas only by the substitution of 3 equivalents of methyl or of ethyl for 3 equivalents of hydrogen, possess the property of combining with different acids, but this is not the case with phosphuretted hydrogen which unites only with iodohydric acid, a compound so unstable that the slightest influences are sufficient for its destruction.

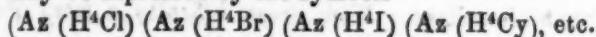
If we have been unable up to this time to form of nitrogen and hydrogen, a compound corresponding to the maximum of saturation,



we nevertheless know a great many which may be considered as belonging to this type, which are comprised in the general formula.



It is thus that dry ammoniacal gas, like a great number of carburets of hydrogen, directly unites, volume to volume, with chlorohydric, bromohydric, iodohydric, cyanhydric; etc., gases, to form compounds which enter in the preceding formula and which may be expressed by the symbols



(To be continued.)

ON COPAIVA PILLS.

BY JNO. M. MAISCH.

Copaiva has been known and employed in medicine for about two hundred years; its use in the various stages of gonorrhœa, however, is not nearly as old, and dates back only to the latter half of the eighteenth century. It has been for a long time given in the pure state, swimming upon water or mixed with a sufficient quantity of sugar to disguise to a certain extent its disagreeable taste. Its property of being emulsioned by the yolk of eggs and by mucilage of gum arabic, was afterwards considered quite a progress, as it was possible to cover and modify the odor and taste to a great degree by the addition of aromatics, ethers and bitter medicines.

For a long time it was considered nearly impossible to obtain a combination of copaiva possessing sufficient adhesiveness to allow its exhibition in the form of pills. This difficulty is owing to the larger quantity of volatile oil which is present in this natural oleo-resin, a good copaiva containing from 30 to 50 per cent. of it. This carbohydrogen is most probably the principal, if not the only active ingredient of copaiva, the medicinal activity of the hard resin, the copaivic acid, being according to the observations with which I am acquainted, nearly destitute of any beneficial effects in the diseases for which copaiva is employed. It would therefore appear, that with the increase of the proportion of the volatile oil, copaiva must become more valuable as a medicine. The largest quantity of volatile oil was observed by Ulex of Hamburg in 1852, in which year a copaiva was imported at that place from Para, containing only 10 per cent. of resin, having a specific gravity of .928 and being, notwithstanding, not nearly as thin as might have been expected. (Archiv d. Ph. 1853, Jan.) Prof. Procter found 80 per cent. of volatile oil in a Para copaiva. See Am. Journ. Ph. 1850, 292.

The first attempts for the formation of pill masses containing copaiva as their principal ingredient, were made with vegetable powders and mucilage. With great difficulty a mass may be formed and divided into pills, but it is the nature of the volatile oils to gradually sweat out upon the surface, causing the pills, to become sticky, and to fix upon them much of the powder in

which they are kept; thus the pills will increase in size; or on the other hand, if the powder possesses little adhesiveness, like lycopodium, it will absorb the exuded oil and the pills will become proportionately weaker.

Such vegetable powders which are very absorbent, are best adapted for the formation of proper pill masses, and powdered marshmallow and liquorice root would deserve attention in this respect, if thereby the bulk of the medicine was not so largely increased. The Pharmacopœias of Hamburg and of Slesvic-Holstein direct equal weights of copaiva and althæa powder to be formed into two grain pills, so that from 15 to 30 pills would constitute a dose. Augustin in his Pharmacopœia extemporanea, Berlin, 1822, directs equal weights of powdered gum arabic and rhubarb with a sufficient quantity of copaiva, to be made into four grain pills; aside from the variable quantity of copaiva necessary for obtaining a proper pill mass, the gum arabic cannot in this case be considered an excipient, as it will absorb much less oil than the rhubarb and the above two powders, and because it will not impart the least adhesiveness to the mass, unless Geisler's suggestions, made in 1840, are followed, and the gum arabic is used, not in the form of powder, but as a thick mucilage; the addition of an absorbent powder will serve then a good purpose. The following formula has been in use in the Hôpital des Vénériens at Paris: *Copaivæ* ʒij , *Pulv. acaciæ* ʒi , *Pulv. glycyrrhizæ* q. s., *Aquæ* q. s. ut ft. boli No. xx. While each bolus contains only 6 grs. of copaiva, its size is very considerable and objectionable for this reason.

Many combinations have been suggested for forming copaiva into masses adapted for boli, which may be considered as less difficult to prepare, because a somewhat softer mass may be employed than for pills. But the use of conserves and electuaries for this purpose, which was first suggested, is by no means adapted, as the oily portion will soon separate, there being no proper emulgens present. Much better is the employment of absorbing powders, and if the nature of the case will admit, some astringent like catechu or kino, together with a thick mucilage as excipient. A tolerably good mass is obtained according to Pierquin's suggestion (Mémoires Pharmaceutiques, Montpellier. 1824,) by the use of soap, in the proportion of 8 to 5 of copaiva,

to which he advises the addition of powdered catechu in sufficient quantity.

Cadet de Gassicourt recommended in his *Formulaire magistral*, Paris, 1826, the addition of one part of magnesia to 21 parts of copaiva. This method of forming it into a suitable pill mass appears to have attracted but very little attention until Mialhe advised in the *Journ. de Chim. Méd. Mars*, 1828, the solidification of copaiva by the addition of 1-16th magnesia. The cause of this solidification was, I believe, first shown by Elias Durand to be the hard resin of copaiva, which from its properties, has received the name of copaivic acid. (See *Journ. of the Phil. Coll. of Pharm.* i. 3.) The combinations formed by this resinous acid in its pure state with the alkalies, earths, and metallic oxides, were studied by J. F. Gerber in 1829, his researches being published in *Archiv der Pharmacie*, vol. xxx.

A similar compound has been already recommended by Godefroy in the *Journ. de Pharm.* June, 1825, where he recommends the preparation of a soda-soap from copaiva, which, however, evidently contains but little of the volatile oil, it being partly expelled by the heat employed for effecting the combination.

A loss of volatile oil is likewise incurred by solidifying copaiva by Thierry's method, with freshly prepared hydrate of lime. (*Journ. de Pharm.* April, 1842). He uses 1 part to 15 parts of the oleo-resin and exposes the mixture to the temperature of a water bath for 4 or 5 hours, until the mass has assumed a pillular consistence; the loss he states to be one-eighth of the weight of the copaiva employed, which is by far too considerable to be overlooked, and it is even probable, that Para copaiva containing much volatile oil, must lose much more before a proper consistence is attained.

The solidification of copaiva with magnesia takes place in the space of a day or two, but requires occasionally several weeks, and sometimes even the evaporation of a portion of the volatile oil, which does not combine with bases. To overcome this difficulty it had been proposed to the Paris Société de Pharmacie to mix such a copaiva with 1-6th turpentine; it was even stated that if adulterated with 1-20th of castor oil, the addition of 1-5th of turpentine would cause it to solidify with 1-16th magnesia. In his report upon this subject, and upon the probable adulteration

of copaiva with turpentine, Guibourt (see Journ. de Pharm. xvi. 562, and Journ. of Phil. Coll. Pharm. iii. 89,) states that turpentine does not form a pillular mass with 1-16th of magnesia, but that it requires about one-eighth of this base, and that consequently turpentine cannot be used for promoting the solidification of copaiva, unless the magnesia is at the same time increased.

An increase of Mialhe's quantity of magnesia will likewise facilitate the hardening of copaiva. The Pharmacopœia Gallica of 1828, edited by Ratier and Henry, contains a pill mass made of equal parts of these ingredients; and Mohr, in Geiger's Pharmacopœia Universalis, gives the following direction for *Pilulæ copaivæ magistrales*: R. *Copaivæ unc. unam, Magnesiae ustæ drach. sex ad septem, f. l. a. pillulæ.*

Copaiva pills made by Mialhe's process are officinal in the United States Pharmacopœia. As the mixture hardens very slowly, and cannot be rolled into pills without their flattening, while the mass is still pliant at ordinary temperature, it is customary to keep the solidified copaiva on hand and form it into pills whenever needed. The application of a moderate heat is then necessary to render the more or less brittle mass sufficiently soft. But notwithstanding all the precautions adopted on the part of the pharmacist, these pills are almost always of a less elegant finish than all those which have adhesiveness imparted to them by an excipient which is not of a resinous nature. A change of temperature will either render them very brittle, or soften them and cause their flattening. But even aside from these considerations, it appears questionable whether these pills deserve a place in the Pharmacopœia among the permanent preparations.

Even if we admit that the copaivic acid is destitute of medicinal properties, and that copaiva, therefore, is not altered in its nature, simply by the admixture of some magnesia, it cannot be doubted that the volatile oil is gradually altered by continued contact with the atmosphere in the presence of a base. It is at least a property of most volatile oils, that their tendency to resinify is augmented by contact with alkalis. Solidified copaiva, as it occurs in commerce, possesses most generally but little odor and taste, and I have met with sugar-coated copaiva pills which were as tasteless as white wax or rosin. It appears

as if the commercial article was hardened by distilling off nearly all the volatile oil. So-called solidifiable copaiva contains but little volatile oil, but a large proportion of copaivic acid; for this reason alone it cannot be but less active than Para copaiva; if made into a mass with magnesia, it will be found to gradually become weaker in odor, and of a less pungent taste, and after some time the quantity of the volatile oil will be found to have materially diminished.

Physicians are aware, I should suppose, that the officinal copaiva pills, when old, are by far less reliable than copaiva itself; but I think the fault has been more generally ascribed to the form of the medicine or to the presence of the resin soap than to the causes as above stated, which appear to me the rational ones. I have always observed, and been informed on inquiry, that copaiva is used in considerable quantities in the form of mixtures, while the officinal pills are employed but very rarely.

It may often be desirable to give copaiva in the form of pills, but it seems more proper to leave it to the physician, who may direct an extemporaneous preparation in which copaiva may be combined with other medicines adapted to the case. In directing a pill mass, however, the physician must not expect the impossible of the pharmacist, who cannot furnish pills containing 5 or 6 grains of copaiva, rich in volatile oil, except by increasing their size to such a degree as to make boli.

For extemporaneous prescriptions, a proper pill mass may be formed of copaiva by mixing it with a sufficient quantity of magnesia, of which about an equal weight will be necessary; if very poor in copaivic acid, no proper consistence can be obtained; and if not objectionable, a small portion, about 5 or 10 per cent. of Canada or true Venice turpentine may be ordered as an addition; a portion of the magnesia may be substituted by one or more vegetable powders, like catechu, kino, rhubarb, cubebs, opium, &c. Such a combination involves less trouble in the preparation of the pills, than with the entire absence of a base, and the powders present are in nearly sufficient quantity to prevent the volatile oil from partially separating upon the surface.

A much better pill mass is formed by the addition of some spermaceti, as proposed by Geiseler, or of wax as recommended by J. Francis Simon about twenty years ago. Particularly the

latter has the advantage of retaining the whole of the volatile oil, and with the further addition of vegetable powder to remain in a plastic condition for years. A little wax does not in the least interfere with the medicinal action of the oleoresin; but the disadvantage is the number of pills required for a single dose, in which respect, however, this is not inferior to other extemporaneous forms of copaiva pills.

If the copaiva does not contain too large a proportion of essential oil, say not over 50 per ct., the quantity of copaiva may be one-third of the weight of the mass, while the wax must not be decreased to less than one-ninth. Simon has given the following proportions of wax, copaiva and vegetable powder each furnishing a good pill mas: 1: 1: 1; 1: $1\frac{1}{2}$: 2; 1: 2: 3; 1: $2\frac{1}{2}$: 4; 1: 3: 5. The same weight of any of these five mixtures contains one-third of copaiva, only the relative proportions of wax and vegetable powder are changed.

With copaiva containing a large amount of volatile oil, the first and second proportion will make good masses which are somewhat soft, but the pills retain their shape and no copaiva is separated; but when the wax is decreased to less than one-half of the weight of copaiva, the volatile oil is likely to separate partially upon the surface.

From a good copaiva containing more than 50 per ct. of volatile oil a good pill mass may be obtained with the following proportions, wherein the wax has been reduced to the smallest possible quantity: Wax one part, copaiva 2 parts, powdered cubebs (or some other vegetable powder) $3\frac{1}{2}$ to 4 p. The Hamburg Pharmacopœia of 1845, directs 2, 4 and 8 parts respectively for the *Pilulæ copaivæ compositæ*. In Germany, where such a combination is frequently prescribed, it is customary to roll the pills in some aromatic powder, like powdered cinnamon, which disguises the disagreeable odor and taste of copaiva. As stated before, such pills will retain their plastic condition for years; and the volatile oil, being protected by the wax and the powder, shows less tendency to change by oxidation, as may be inferred from the odor and taste of the pills after they had been made several years.

The manipulation in preparing these pills is as follows: the wax is fused at a moderate heat, the copaiva is now gradually

added, and immediately afterwards the powder is stirred into the warm mixture in small portions and well incorporated. The mass is then ready for rolling out and cutting into pills. It is, of course, requisite, during the incorporation of the ingredients, to keep the mass at as low a temperature as is possible for avoiding a loss of the volatile oil; but it must be sufficiently high to prevent the wax from congealing before the operation is completed. Some pharmacutists fuse together equal parts of wax and copaiva and keep this mixture on hand. It answers admirably, if the addition of much copaiva is not required for the prescription; the oleoresin it seems, does not combine so intimately with the wax in the cold as in the warm state, and the pills are therefore likely to sweat.

It deserves also to be mentioned, that the pills are not so large as might be judged from their weight; the wax decreases the bulk to a certain extent.

These extemporaneous copaiva pills are, I believe, almost totally unknown in the United States; but I am convinced that physicians, after they have once tried them, will find them superior to the solidified copaiva as usually kept; and the pharmacutists will be able to dispense the pills of this medicine as of others, of even size, perfectly globular and retaining their original shape. From these considerations, I have frequently recommended them to physicians, who have generally been satisfied with the result; and while connected with Parrish's School of Pharmacy, I had them prepared by all the classes. These pills deserve to be more extensively known and employed.

Brooklyn, N. Y., Nov., 1862.

SODA IN COAL.

By E. S. WAYNE.

The presence of soda in coal, I have not seen mentioned in any analysis of it that has come under my notice, and presume the cause of its having been overlooked, is the minute quantity in it, only to be detected by operating upon much larger quantities than generally used in analysis.

My detection of it in coal was unlooked for and accidental.

Having frequently observed a pale ochreous deposit upon the casting stills I was using for the distillation of coal oil, curiosity at last induced me to make an analysis of it; and I found it to be composed of alumina, silica, oxide of iron and sulphate of soda. Now under this still had been burnt a number of thousands of baskets of coke from cannel coal, from which the crude coal oil had been extracted, and which was unquestionably the source of both the soda and sulphuric acid in the sulphate of soda found in the deposit. In what state the soda existed in the original coal, or in the coke, I cannot say. Whatever it was, it must have been reduced by the carbon of the coke during its combustion, to sodium, and its vapor deposited upon the bottom of the still, and being exposed to the sulphurous products of combustion, combining with them, and finally, through the agency of heat and air, was oxidized to a sulphate as found.

The presence of soda in coal is an interesting fact, in several respects, particularly so to the palæontologist and geologist, as it tends to point out the habitat of the vegetation, whose remains it consists of.

Cincinnati, Nov. 1st, 1862.

ASSAY OF ALKALOIDS—PURE AND IN PREPARATIONS.

BY FERDINAND F. MAYER.

In a paper laid before the last meeting of the American Pharmaceutical Association (August, 1862,) I pointed out the facility with which the iodohydrargyrate of potassium could be used for the quantitative determination of all vegetable alkaloids, either pure or contained in pharmaceutical preparations.

This test, which was first described by F. L. Winckler, in 1830,* as a qualitative reagent, and was introduced in 1846 by A. von Planta-Reichenau,† is simply a solution of corrosive sublimate in an excess of iodide of potassium, the strength of which for volumetric analysis is 13.546 grammes of corrosive

* Buchner's Repertorium, vol. xxxv. p. 57. On some Precipitates caused by solutions of Hydrochlorate of Quinia and by Iodide of Mercury.

† Das Verhalten der Alkaloide gegen Reagentien. Heidelberg, bei J. C. Mohr. 1846.

sublimate and 49.8 grammes of iodide of potassium per litre, constituting a *tenth normal solution*.

Of this solution it requires

1 cubic centimeter for the precipitation of

	In grammes.
1-10.000 of an equivalent of Aconitia	= 0.0267
1-20.000 " " Atropia	= 0.0145
1-20.000 " " Narcotina	= 0.0213
1-20.000 " " Strychnia	= 0.0167
1-20.000 " " Brucia	= 0.0233
1-20.000 " " Veratria	= 0.0269
1-30.000 of a double equiv. of Morphia	= 0.020
1-20.000 " " Conia	= 0.00416
1-40.000 " " Nicotia	= 0.00405
1-60.000 of a double eq. of Quinia	= 0.0108
	Cinchonia = 0.0102
	Quinidia = 0.0120

The compounds formed are the hydriodates of the base with iodide of mercury ; in consequence of which a part of the mercury used for precipitation remains in solution. For this reason a solution of chloride, and not of iodide of mercury must be used, inasmuch as with a solution of the latter the results very much differ ; nor must the solution of alkaloid be added to the mercuric solution, but the latter to the former. These precipitates form in acid, neutral, and slightly alkaline solutions, and, as Nessler noticed,* permit the separation of the bases from ammonia.

They are further not interfered with by the usual constituents of pharmaceutical preparations, except alcohol and acetic acid, in both of which the precipitates are soluble. In this the iodohydrargyrates and Groves'† bromohydrargyrates differ from all other precipitants of the alkaloids, which as a rule do not allow of the presence of starch, gum, albumen, or tannic acids.

As to the intensity of the reaction, it falls in some cases short

* Verhalten des Jodquecksilbers zu Ammoniak und eine neue Reaction auf Ammoniak. Inaugural Dissertation, Freiburg 1856. Also, Chemisches Centralblatt, 1856. No. 34.—Jahresbericht der Chemie for 1856.

† Quarterly Journal of the Chemical Society, vol. xi. p. 97. Pharm. Journal and Trans. vol. xviii. p. 131. Jahresbericht der Chemie for 1858.

of that produced by phosphomolybdic acid, while in others it far exceeds it.

Distinct reactions are obtained with iodohydrargyrate of potassium in solutions, containing

1-2500 of Morphia,	1-150000 of Strychnia,
1-7000 of Atropia,	1-50.000 of Brucia,
1-60.000 of Narcotina,	1-125000 of Quinia,
1-8000 of Conia,	1-75.000 of Cinchonia,
1-25000 of Nicotia,	1-50.000 of Quinidia.

In mixtures with inert, coloring or other ingredients the end of the precipitation is determined by filtration on a watch-glass, and testing the small quantity so filtered. The reaction is, however, rendered incomparably more distinct when a certain measure or bulk of solution has been prepared from the extract or mixture by means of dialysis through parchment paper.

But where no coloring matter or substances affecting nitrate of silver are present, the excess of iodohydrargyrate and of iodine and chlorine may at once be determined without filtration by the tenth normal solution of nitrate of silver, using Mohr's indicator, the neutral chromate of potassa; and where great exactness is required, and but small quantities of the substance are operated upon, the hundredth normal solution of silver should be used.

Each cubic centimeter of the tenth normal solution iodohydrargyrate requires for the separation of its iodine and chlorine 4 cubic-centimeters of tenth normal or 40 cc of hundredth normal solution of silver. Each cubic centimeter of the $\frac{1}{10}$ normal and every 10 cc. of the $\frac{1}{100}$ normal solution of silver correspond to 0.25 cc. of $\frac{1}{10}$ normal solution of iodohydrargyrate.

The precipitate of iodide of mercury and of alkaloid, at the concentration of the test-solutions, being in no way affected by them in testing a clear solution of an alkaloid, it is therefore only necessary to add enough iodohydrargyrate to be in excess, and then the $\frac{1}{10}$ or $\frac{1}{100}$ normal solution of silver with the precautions given by Mohr, until the red color of chromate of silver remains stationary.

For the use of pharmacutists not in possession of metrical weights or graduates, a solution prepared and to be used with Troy weights must be of the following strength:

16½ grains of corrosive sublimate and 100 grains of iodide of potassium are dissolved in enough pure water to make up 12½ ounces Troy = 6000 grains.

Of this solution every

10 grains will precipitate	0.0534	of a grain of	Aconitia
"	0.0289	" "	Atropia.
"	0.0389	" "	Atropiæ Sulphas.
"	0.0334	" "	Strychnia.
"	0.0466	" "	Brucia.
"	0.0538	" "	Veratria.
"	0.040	" "	Morphia.
"	0.050	" "	Morphiæ Sulphas.
"	0.0083	" "	Conia.
"	0.0081	" "	Nicotia.
"	0.0216	" "	Quinia.
"	0.0296	" "	Quinæ Sulphas.
"	0.0204	" "	Cinchonia.
"	0.025	" "	Cinchoniæ Sulphas.
"	0.024	" "	Quinidia.
"	0.0284	" "	Quinidiæ Sulphas.

From a flask with this solution balanced on the scales, the test liquor is added as long as it produces a precipitate which is to be found by repeatedly filtering; the balance is then restored by additional weights, which express the quantity of test-liquor consumed. The results obtained are sufficiently correct for pharmaceutical purposes. When the operator has sufficient faith in his ability to carry out a more lengthy operation, he may finish the assay with a solution of silver, containing in 6000 grains 81½ grains of pure nitrate of silver, every 40 grains of which solution correspond to ten grains of the Troy solution of iodo-hydrargyrate.

This method like all those of volumetric analysis precludes the presence of other alkaloids besides the one immediately concerned. It is directly applicable in solutions of a single alkaloid, or when only one alkaloid is assumed to be present. Mixtures of alkaloids will have to be parted by preparatory manipulations, unless, as in the case of the sulphates of the cinchona alkaloids, their different solubility in water or other solvents permits the direct application of the test in a certain degree.

An application of particular value to the pharmacist will

be the testing of the strength of such preparations, the value or action of which depends on the presence of one alkaloid, or two very closely related (conia, conhydria,) and about the qualitative nature of which he is not in doubt.

If such doubts exist, the alkaloid can be separated from the precipitate in the following manner:

A small quantity of the solution of alkaloid is precipitated by the iodohydrargyrate; the precipitate is collected on a small filter, washed thoroughly with cold water, and, after draining dissolved in the smallest quantity of boiling dilute alcohol. To this solution a drop, or more according to the quantity of precipitate, of freshly prepared hydrosulphate of ammonia is added, and after this a drop or two of tincture of iron, taking care to have an excess of ammonia present. The whole is then thrown on a filter, washed with hot alcohol, and the filtrate, after being acidulated with sulphuric acid, passed through animal charcoal if necessary. It is then treated by Stas' and Otto's method for the elimination of alkaloids.

The subjoined assays of atropia and preparations of Belladonna and Stramonium will in part exemplify the details of the process, and also show some of the variations and changes of these preparations.

A number of the extracts of these narcotics included among those mentioned below, have been tried in an informal manner for the dilatation of the pupil by one of the surgeons of the New York Eye Infirmary, and whenever the effect had been closely watched, the strength of the extract was found to correspond with the quantitative test or percentage of alkaloid. The dilatation of the pupil is, however, a much more delicate reagent for very minute quantities of the mydriatics than either the iodohydrargyrate of potassium, or phosphomolybdic acid.

ASSAY OF ATROPIA AND PREPARATIONS OF STRAMONIUM AND BELLADONNA.

Equivalent of Atropia (Daturia) = 289 = $C_{34}H_{23}NO_6$.

“ “ Sulphate of atropia = 338 = $C_{34}H_{23}NO_6 + SO_3HO$.

1 cc. $\frac{1}{10}$ solution of iodohydrargyrate = 0.0145 of a gramme of atropia.

1 cc. $\frac{1}{10}$ solution of iodohydrargyrate = 0.0169 of a gramme of atropiæ sulphas.

1 cc. $\frac{1}{10}$ solution of iodohydrargyrate = 4 cc. $\frac{1}{10}$ solution of silver.

1 cc. $\frac{1}{10}$ solution of silver = 0.25 cc. $\frac{1}{10}$ solution iodohydrargyrate.

10 grains of Troy solution iodohydrarg. = 0.0289 of a grain of atropia.

10 grains of Troy solution iodohydrarg. = 0.0338 of a grain of atropiæ sulphas.

In order to test a solution of atropia, or a salt of it, it must not exceed one per cent. in strength, must be free from alcohol, acetic acid, or ammonia, in the presence of which precipitation does not take place. Nor must any soluble sulphuret or cyanuret be present, because they precipitate or decompose the reagent before its combination with the alkaloid.

A.—The Solution of 0.5 gramme of pure Sulphate of Atropia dissolved to 100 cc. in water.

10 cc. with 4 cc. $\frac{1}{10}$ solution iodohydrarg. showed 12.2 cc. $\frac{1}{10}$ solution silver, equal to 3.05 cc. $\frac{1}{10}$ solution iodohydrarg., instead of 2.95 cc., or 0.0517 gramme of sulphate of atropia, instead of 0.0500 gramme.

10 cc. with 3.5 cc. $\frac{1}{10}$ sol. iodohydrarg. showed 11.1 cc. $\frac{1}{10}$ sol. silver, equal to 2.9 cc. $\frac{1}{10}$ sol. iodohydrarg., instead of 2.95 cc., or 0.0491 gramme of sulphate of atropia instead of 0.0500 gramme.

10 cc. with 3.5 cc. $\frac{1}{10}$ sol. iodohydrarg. showed 11 cc. $\frac{1}{10}$ sol. silver = 0.0501 gramme instead of 0.0500.

The average of these three assays, which were the first made by this method, is 100.6 p. c., instead of 100 p. c.

The precipitation is performed in a small beaker placed first on a sheet of dark glazed paper, while the iodohydrargyrate is being added. An excess of the latter is readily perceived from the non-increase of the precipitate, which is at first curdy, then falls together into a canary colored, resinous mass, which strongly adheres to the glass, and shrinks considerably before it hardens; exposed to the air it forms pearls of the appear-

ance of pale resin. It is a hydriodate of atropia with one equivalent of iodide of mercury, $C_{34}H_{23}NO_6HI + HgI$, one-half the mercury of the test-liquor remaining in solution.

After the precipitation, the beaker is placed on white paper, some carbonate of soda, and a few drops of a solution of chromate of potassa added, and the $\frac{1}{10}$ sol. silver dropped in until the red color of chromate of silver remains permanent after stirring.

The number of cubic centimeters of $\frac{1}{10}$ sol. silver divided by 4 and subtracted from the number of cubic centimeters of $\frac{1}{10}$ sol. iodohydrargyrate, leaves the quantity of the latter that has been consumed for precipitation. The last $\frac{1}{20}$ cc. of $\frac{1}{10}$ sol. silver is not counted.

The solutions to be tested should be divided into at least four equal parts, in order to enable the operator to repeat the test, and thus to control it.

B.—Preparations of *Datura Stramonium*.

I. *Juice from the Fresh Leaves*.—36 grammes of juice from 100 grammes of fresh leaves gathered in September, during the last period of flowering.

They were diluted to 100 cc. with the water with which the residual cake had been again pressed; then filtered. A little of the solution evaporated and calcined and the ashes exhausted with water, gave a slight precipitate with acid nitrate of silver. It was therefore tested with $\frac{1}{10}$ sol. iodohydrarg. alone, as was done in the case of all the other preparations.

25 cc. of the filtered diluted juice required for precipitation 1.3 cc. $\frac{1}{10}$ sol. iodohydrarg.

25 cc. of the same required 1.4 cc. $\frac{1}{10}$ sol. iodohydrarg.

“ “ “ “ 1.3 cc. “ “

For 100 cc. therefore 5.33 cc. = 0.0772 gramme or p. c. of atropia in the *fresh* leaves.

II. *Juice from 30 grammes of dried leaves, expressed after maceration with water, acidulated with oxalic acid, and diluted to 200 cc., then filtered.*

50 cc. precipitated required 2.9 cc. $\frac{1}{10}$ sol. iodohydrarg.

“ “ “ 3.15 “ “

200 cc. therefore = 12.1 cc. = 0.17545 gramme of atropia
= 0.527 p. c. of atropia in the *dried leaves*.

The precipitation from the last assay, which was of a pale brownish color, was decomposed in the manner delineated above, using oxalic acid to acidulate, evaporated very slowly nearly to dryness, redissolved in water, filtered, and again tested with $\frac{1}{10}$ sol. iodohydrarg. required 3 cc. of the latter. This may be assumed as proof that the resinous coloring-matter (pseudo toxin?)* which is carried down with the precipitate, does not carry with it any of the iodide of mercury.

III. 50 cc. of the above solution from dried leaves were evaporated in the water bath, to the consistence of extract, then redissolved in water to 100 cc. and filtered.

70 cc. of this solution required for precipitation 0.5 cc. $\frac{1}{10}$ sol. iodohyd.

Before evaporation

2.1 cc.

Hence it would appear that about three-fourths of the atropia present in the original solution was driven off during the evaporation.

From an aqueous infusion of the dry leaves acidulated with oxalic acid, which, after the precipitation of the atropia, still retained the narcotic odor, an acid distillate was obtained, possessing an odor of tobacco, but containing neither ammonia nor alkaloid.

IV. *Tinctura Stramonii Fol.* (By displacement).

100 cc. were acidulated with oxalic acid and left to spontaneous evaporation. The residue was diluted to 100 cc. and filtered.

25 cc. required 1.1 cc. $\frac{1}{10}$ sol. iodohydrarg.

100 cc. of the tincture therefore = 0.0638 gramme or weight p. c. of atropia.

V. *Tinctura Stramonii Sem.* U. S. P.

50 cc. acidulated with oxalic acid, were left to spontaneous evaporation, then diluted to 100 cc. and filtered.

* From alcoholic preparations this coloring-matter is mostly chlorophyll.

50 cc. required 1 cc. $\frac{1}{10}$ sol. iodohydrarg.
= 0.029 p.c. of atropia.

VI. *Extractum Stramonii Fol. Fluidum* (By Prof. Procter's formula.)

50 cc. acidulated with oxalic acid, spontaneously evaporated, then diluted to 100 cc. and filtered.

25 cc. required 5 cc. $\frac{1}{10}$ sol. iodohydrarg.
= 0.59 p. c. of atropia.

(The same leaves extracted by water as under II. had yielded 0.527 p. c.)

VII. *Extractum Stramonii Fol. Alcoholicum.* (U. S. P.)

5 grammes dissolved in water acidulated with hydrochloric acid to 100 cc.

40 cc. required 2.6 cc. $\frac{1}{10}$ sol. iodohydrarg. = 1.886 p. c. of atropia.

VIII. 20 grammes of the same extract rubbed up with part of 400 cc. of water acidulated with hydrochloric acid, and dialysed through parchment paper into the remainder of the 400 cc. required 54 hours to give a solution of the same strength, at a medium temperature of 50° F.

IX. *Extractum Stramonii Fol. Siccum.* (Ph. Boruss. half strength.)

10 grammes diffused in dilute oxalic acid to 100 cc., then filtered.

25 cc. required 4.5 cc. $\frac{1}{10}$ sol. iodohydrarg.
= 2.61 p. c. of atropia.

C.—Preparations of *Belladonna*.

I. *Tinctura Belladonnæ* U. S.

30 cc. with oxalic acid, left to spontaneous evaporation, then diluted to 75 cc. and filtered.

25 cc. required 1.5 cc. $\frac{1}{10}$ sol. iodohydrarg. = 0.2175 p. c. atropia.

II. *Tinctura Belladonnæ ex herb. rec.* (Hahnemann's.)

100 cubic centimetres with oxalic acid, spontaneously evaporated; then again diluted to 100 cc. and filtered.

25 cc. required 3.75 cc. $\frac{1}{10}$ sol. iodohydrarg. = 0.2175 p. c. atropia.

III. *Extractum Belladonnæ Fol. Fluidum.* (By Prof. Procter's formula.)

a. 30 cc. of the fluid extract acidulated and left to spontaneous evaporation, then diluted to 100 cc. and filtered.

20 cc. required 4.5 cc. $\frac{1}{10}$ sol. iodohydrarg.
= 1.087 p. c. atropia.

b. 60 cc. of the same fluid extract, acidulated with oxalic acid, and evaporated on the water-bath; then diluted to 100 cc., and filtered.

30 cc. required 11 cc. $\frac{1}{10}$ sol. iodohydrarg.
= 0.88 p. c. of atropia.

This extract according to this assay, had lost one-fifth of the alkaloid by the evaporation.

IV. *Extractum Belladonnæ Alcoholicum.* (U. S. P.) from selected leaves, showed 4.03 p. c. of atropia.

V. *Extractum Belladonnæ Alcohol.* (U. S. P.) from another source, showed 3.56 p. c. of atropia.

VI. *Extractum Belladonnæ Siccum* (Pharm. Boruss. half strength,) gave 0.906 p. c. of atropia.

VII. *Extractum Belladonnæ Aquosum*, from selected leaves, gave 3.26 p. c. of atropia.

New York, December 10th, 1862.

GLEANINGS FROM THE GERMAN JOURNALS.

By JOHN M. MAISCH.

Solubility of benzoic acid and benzoates.—Dr. Rob. Otto, in a paper on some derivatives of benzoic and hippuric acid, gives the solubility in water of

1. Benzoic acid from urine, 1 in 392.1 parts.

2. Benzoic acid from oil of bitter almonds : 1 in 331 p.
3. Benzoic acid from chlorobenzoic, prepared from hippuric acid : 1 in 246.6 p.
4. The same after sublimation : 1 in 248.4 p.
5. Benzoic acid from benzalanine : 1 in 263.5 p.
6. Benzoic acid from chlorobenzoic, prepared from ordinary benzoic acid : 1 in 123.7 p.
7. Benzoate of potassa, prepared from urine : 1 in 26.5 p.
8. Benzoate of potassa, prepared from oil of bitter almonds : 1 in 1.5 p.
9. Benzoate of lime, with the acid from hippuric acid : 1 in 28.6 p.
10. With the acid from oil of bitter almonds : 1 in 37.7 p.
11. With the acid from chlorohippuric acid : 1 in 12.8 p.
12. With the same acid sublimed : 1 in 44.9 p.
13. With the acid from chlorobenzoic, prepared from ordinary benzoic acid : 1 in 14.4 p.

The statements have reference for the acid to water of 0° C. (32° F.), and for the anhydrous salts to water of 12° C. (54.6° F.) —(Ann. d. Ch. und Ph. 1862, May, 162.)

Assay of iodine.—For dissolving commercial iodine, O. Hesse replaces the sulphurous acid usually employed, by sulphite of ammonia, prepared from ammonia of 4 per cent., by passing into it gaseous sulphurous acid, until the liquid has a slight odor of the acid ; the iodide of silver is to be freed from a little sulphate by boiling with water acidulated with nitric acid.—(Ibid, 225.)

Urate of lithia.—Gust. von Schilling found, like Lipowitz, that, on boiling, 4 p. uric acid are dissolved by 1 part carbonate of lithia, with the extrication of carbonic acid, and that the solution gelatinizes on cooling ; but a neutral salt could not be obtained under any circumstance. The acid salt $\text{LiO}, \text{HO}, \text{C}_{10}\text{H}_2\text{N}_4\text{O}_4$, has a neutral reaction to test-paper, is decomposed by a current of carbonic acid ; and dissolves in 38.97 p. boiling water, in 115.79 parts water of 39° C. and in 367.82 p. water of 20° C., (68° F.) —(Ibid, 241.)

Detection of morphia and strychnia.—J. Erdmann has extracted these alkaloids from the entrails of poisoned animals by means of his method with amylic alcohol. (See Amer. J. Ph.

x. 354.) The decoction with muriatic acid was strained, the liquid supersaturated with ammonia and evaporated after the addition of pure quartz sand, in order to reduce it to powder previous to its treatment with amylic alcohol. This solution is shaken with ten or twelve times its volume of acidulated water. Strychnia was precipitated by soda, morphia by ammonia.—(Ibid, June, 360.)

Influence of chloride of lime upon amylic alcohol.—F. Gerhard attempted to isolate from chloroform the compound which is colored dark-brown by sulphuric acid. Supposing it to be a derivative from amylic alcohol, he subjected 120 grm. of the latter to distillation in presence of 1500 grm. chlorinated lime and 2500 grm. water. The body mentioned had to be removed by sulphuric acid; the remainder contained chloroform and chloride of butyle. The residue in the retort contained butyric acid.—(Ibid, 363—366.)

Conversion of glyceric into acrylic acid.—By treating glyceric acid $C_6H_6O_3$, with iodide of phosphorus, F. Beilstein obtained iodo-propionic acid, $C_6H_5IO_4$. On boiling one of the salts of the latter, a new acid is liberated, hydracrylic acid, probably $C_{24}H_{22}O_{22}$, the lead-and-silver-salt of which yield on dry distillation acrylic acid $C_6H_4O_4$.—(Ibid, 366—374.)

Bismuthic acid.—The deep brown red precipitate, obtained on treating a solution of nitrate of bismuth with a concentrated solution of cyanide of potassium, has, after washing with boiling water, according to Deichmann and Bœdeker, the composition $BiO_3 + 2 aq.$ —(Ibid, July, 61.)

Reaction between muriatic and hydrocyanic acid.—A. Berthold states that muriatic acid gas, passed through anhydrous hydrocyanic acid, which is sufficiently cooled down, exerts no influence. If the latter is agitated with fuming muriatic acid, it separates like an ether upon the surface: under certain circumstances, however, a sudden and most violent reaction takes place and white crystals are separated. The same are formed quietly, if a homogeneous mixture of the two acids has been effected by means of alcohol. The crystals are chloride of ammonium, as was previously found by Kuhlmann.—(Ibid, 63.)

Decomposition of chloroform by potassa.—Pure or commercial chloroform, treated with alcoholic solution of potassa, particularly if the latter be diluted with water, evolves a gas burning with a green flame; but if the gas has been well purified by water, it burns with the dull blue flame of carbonic oxide. Prof. A. Genthner concludes therefrom, that the formula of chloroform must be written C_2Cl_2, HCl ; its phases of decomposition will then be as follows: First, the hydrochloric acid is removed; next the chloride of carbon is decomposed with the formation of the corresponding carbonic oxide, which is evolved as gas, but may be completely formed into formic acid, provided it meets with sufficient caustic potassa.—(Ibid, 121.)

Hydrobenzoine, $C_{28}H_{14}O_4$, is a new body discovered by N. Zinin; it is the product of the reaction of nascent hydrogen upon pure oil of bitter almonds dissolved in alcohol; it crystallizes from ether in granules, and from alcohol in rhombic tables; it is not affected by alcoholic or aqueous solution of potassa. Treated with warm nitric acid of 1.36 sp. gr. it is entirely converted into pure benzoine.—(Ibid, 125, from Bull. de l'Acad. de St. Petersb.)

The transformation of sugar into mannite has been accomplished by E. Linnemann. Cane sugar is first treated with dilute sulphuric acid at ordinary temperature; the solution is freed from acid, concentrated and treated with sodium amalgam in small quantities. After the reaction is complete, the alkali is neutralized by sulphuric acid, the whole evaporated to a syrup and mixed with alcohol. The sugars of the formula $C_{12}H_{12}O_{12}$ behave very differently under the same circumstances; but several yield mannite. The author supposes that it is the levulose of the cane sugar modified as above, which changes into mannite, and which is probably the same sugar, obtained by Berthelot by an oxidizing fermentation from mannite.—(Ibid, 136—140.)

Rutine.—Zwenger and Dronke have investigated the rutine prepared from *Ruta graveolens* and *Capparis spinosa*, and compared it with quercitrine and robinine, both of which it closely resembles. The solutions of rutine and quercitrine show a nearly identical behaviour to reagents, but their physical properties, crystalline form, fusing point and solubility in water, are

very different. There is scarcely a difference in the physical properties of robinine and rutine, but the latter is precipitated by acetate of lead, and does not reduce an alkaline solution of cupric oxide, while robinine behaves quite reversely. The main difference between these three glucosides consists in the sugars which are combined with quercetine, as follows :

Quercitrine $C_{26}H_{10}O_{12} + C_{12}H_8O_6 + 6 \text{ aq.}$

Rutine $C_{26}H_{10}O_{12} + 2(C_{12}H_8O_6) + 5 \text{ aq.}$

Robinine $C_{26}H_{10}O_{12} + 2(C_{12}H_{10}O_{10}) + 11 \text{ aq.}$

—(Ibid, Aug., 145—157.)

Decomposition of subliming sal-ammoniac.—By surrounding the vapors of sal-ammoniac with an atmosphere of hydrogen, L. Pebal found, that free ammonia diffuses into this gas while the vapors of the salt contain free hydrochloric acid. It is evident therefrom that on vaporizing, sal-ammoniac is decomposed, and the abnormal condensation of its vapor is explained by the reunion of the two gases.—(Ibid, 199—202.)

Combination of nitrogen with metals.—Briegleb and Genther have experimented upon the direct combination of gaseous nitrogen with the metals at an elevated temperature. In this way they obtained the compounds Mg_3N and Cr_2N and ascertained that zinc, iron and aluminium will thus combine with nitrogen ; this is probably true for all metals whose nitrogen compounds remain unaffected by a high temperature.—(Ibid, 228—241.)

Baryta and strontia in lime stones.—When in presence of much lime, the spectra of baryta and strontia become invisible ; Kirchhoff and Bunsen, therefore, convert the alkaline earths into nitrates, and exhaust the lime salt by alcohol. Dr. Engelbach now shows that by igniting the carbonates of such mixtures of the alkaline earths, the oxides of strontium and barium are more readily formed than that of calcium, and may then be exhausted by boiling with a little water. The process is well adapted for the qualitative recognition of minute quantities of strontia and baryta in lime compounds.—(Ibid, 255—261.)

Sarkosina.—Chloroacetic acid yields under the influence of methylamina, according to J. Volhard, sarkosina, the same base which was first obtained by Liebig from kreatina.—(Ibid, 261—265.)

Precipitation of chlorides by muriatic acid gas.—Dr. C. Schrader found that from a solution of the chlorides of potassium and sodium, muriatic acid gas separates mixtures which are at first richest in potassium; in the presence of chloride of magnesium the latter does not appear in the precipitate, until the solution has absorbed more than 20 per ct. of muriatic acid. Margueritte's results, (Cpt. rend. xliii. 50,) are thus contradicted. —(Ibid, 265.)

Oil of rue.—Dr. C. Harbordt has again analyzed the pure oxygenated portion of oil of rue and found Williams' results correct, namely $C_{22}H_{22}O_2$. Desirous to ascertain to which class of bodies it belongs, he oxidized it by chromic and by nitric acid, and obtained chiefly caprinic acid, but no acid containing more carbon. He concludes therefore, that it is not an aldehyde, but belongs to the ketones, that its rational formula is C_2H_3 , $C_{20}H_{19}O_2$ and consequently its proper name methylo-caprinol. —(Ibid, Sept. 293—297.)

Decomposition of solania.—Zwenger and Kind have before reported that solania $C_{86}H_{70}NO_{32}$ is on boiling with dilute acids decomposed into solanidia $C_{60}H_{40}NO_2$ and sugar, but that by concentrated acids, the solanidia yields two new bases. These have since been investigated. One is readily soluble in ether, appears as a resin-like yellow mass and yields uncrystallizable salts; cautiously heated in carbonic acid, it yields crystalline solanidia; of which it is probably a modification.

The other base dissolves in 2000 parts of boiling ether, and is obtained in crystalline yellowish floccules or fine needles; the solutions of its salts are colored violet by concentrated sulphuric acid, and red by most other concentrated acids. Its composition is $C_{60}H_{30}NO$; the authors have called it solanicia. Both bases are very sparingly soluble in boiling alcohol. —(Ibid, 341—347.)

Decomposition of coffeina.—A. Strecker has boiled a concentrated aqueous solution of coffeina with two volumes of concentrated baryta water, and found in the distillate ammonia and methylamina, while the retort contained besides carbonate of baryta and some other organic compounds, a new alkaloid, coffeidina, $C_{14}H_{12}N_4O_2$, which is a stronger base than coffeina, is little soluble in ether, readily in water and alcohol, and does not

crystallize on evaporating these solutions; its sulphate crystallizes in long colorless needles.—(Ibid, 360—363.)

Oxidation by alloxan.—A. Strecker observed that alloxan is colored purple by alanine, and that with a moderate heat carbonic acid and aldehyde are given off. Leucine behaves similarly, valer-aldehyde distilling over. Alloxan combines with hydrogen to alloxantine, which forms murexide with ammonia, at the same time alanine and leucine are oxidized to aldehyde, carbonic acid and ammonia. The reaction of glycocoll is similar; but the aldehyde of formic acid could not be detected.—(Ibid, 363—365.)

Hog gall.—Among the constituents of hog gall, which are present only in small quantities, A. Strecker found carolactic acid, a phosphuretted fat, which was previously observed by Goble in ox gall, and an organic base, cholina $C_{10}H_{13}NO_2$. Its platino-chloride crystallizes in orange-yellow thin laminæ; the muriate, sulphate, carbonate, nitrate and oxalate are uncrystallizable. Cholina was also prepared from ox gall.—(Ibid, 353—359.)

Identity of melampyrine and dulcite.—Melampyrine was discovered by Hünefeld in the herb of *Melampyrum nemorosum*, and afterwards found in *Scrophularia nodosa* and *Rhinanthus crista galli*; Eichler has given the formula $C_{12}H_{15}O_{13}$.

Dr. L. Gilmer has examined melampyrine prepared by E. Merck, of Darmstadt, and from the elementary analysis of it and its baryta compound, calculated the formula $C_{12}H_{14}O_{12}$. From the angles of its monoklinometric crystals, from the fusing point ($182^\circ F.$), from the behaviour to nitric acid, and metallic oxides, and from the solubility in water, (100 parts dissolve between 15 and $16^\circ C.$ 32 to 34 parts,) the author concludes, that it is identical with dulcite, and also with Kubel's euonymite, prepared from *Euonymus europæus*.—(Ibid, 372—377.)

ON LIQUID RENNET, OR RENNET WINE.

BY WILLIAM PROCTER, JR.

It has long been known that the mucous coat of the stomach of the calf, pig, and other young mammals possesses the power of coagulating the casein of milk, as in the making of cheese; but it is only of latter years that attempts have been made to introduce a solution of *rennet*, as this substance is called, into Pharmacy with a view to the *cuisine*, as well as for use in medicine. For several years *pepsin*, the proximate principle to which this coagulating power is attributed, in an impure state, has been an article of commerce with a view to medicinal use in diabetes and other diseases; that prepared by M. Boudalt, of Paris, having acquired some celebrity.

In several pharmaceutical works, recipes for making "Liquid Rennet" may be found, but these vary much, both as regards the strength of the solution and the preservative ingredients. The dried stomach of the calf prepared by salting it, and stretching it over a bent hoop to facilitate its desiccation, is familiarly known in the markets of Philadelphia under the name of rennet, and most housekeepers prefer to keep and use it in this state, or by cutting this up and macerating it in wine, but for those who aim at manufacturing the solution for commerce, it is preferable to employ the recent membranes both on account of economy and efficiency.

Pepsin has never been isolated in a state of purity; it seems to be secreted by glands located in the mucous coat of the stomach, and in connection with hydrochloric, and perhaps lactic acid, constitutes the active portion of what is called the *gastric juice*, concerned in the process of digestion. It is to this mucous coat of the organ, therefore, that attention must be given; and inasmuch as the rennet tends to exercise its digestive power on the membrane itself, there is a propriety in using mechanical means to effect the rupture of the mucous coating to facilitate the extraction of the active principle without cutting it up, by malaxating them in water with salt, to which weak alcohol or wine is subsequently added. Some prefer at once to separate by the knife the mucous coat with the glands, but generally the whole organ is cut up, mixed with salt and water, and well malaxated at intervals, for a time varying from twenty-four hours

to two months. Soubeiran gives the following recipe as that of Wislin. He takes of the stomachs of young calves, *ten* parts; chloride of sodium *three* parts; alcohol, of 80 per cent., *one* part; and water *sixteen* parts. The stomachs are slit with a scissors so as to expose the interior, they having been previously gently rinsed to remove foreign particles adherent; they are then malaxated with the dry salt thoroughly, and left in a cool place until the cheesy odor at first apparent, becomes replaced by that of rennet, which requires one or two months. At this period it is macerated in the water for a short time, the alcohol is added, and the liquid portion strained off and filtered for use.

Dorvault, in his "L'Officine," gives the following recipe: "Take of recent rennet 375 parts; common salt 60 parts; alcohol of 75 per cent., 60 parts; white wine 1000 parts. Digest the whole for a month and filter. A teaspoonful is sufficient for a quart of milk."

Some believe that the rennet during the protracted process of curing by salt is rendered more active, and that it is necessary to delay the final process of solution until after that operation; but this is doubtless incorrect, in fact, though it may seem to be true, as the truth lies more in the mechanical effect of salting in breaking or causing the shrinking of the tissue, and in altering the resistant or pulpy condition of the mucus, than in any development of increased power; and hence, there appears to be no good reason why it should be protracted beyond a few days, unless with the intention of curing the rennets for future use. After several trials the following is offered as a practicable formula for making

LIQUID RENNET, OR RENNET WINE.

Take of Fresh Rennets, (about three,)	twenty-four troyounces,
Chloride of sodium,	three troyounces,
Alcohol,	six fluidounces,
White wine,	sixteen fluidounces,
Water,	a sufficient quantity.

Having turned the rennets inside out, and washed them by a gentle stream of water for a few moments without any friction, and having placed them in a shallow dish, sprinkle half of the

salt over them, and, with the hands malaxate them vigorously for fifteen minutes, aiming to disengage the mucous secretion, then add a pint of water, again malaxate, and after standing several hours strain off the thick mucilaginous liquid by pressure in a loose-textured cotton cloth. Return the rennets to the dish, sprinkle on the remainder of the salt, again repeat the process of malaxation, maceration and expression. Let these operations be repeated a third time, or until the fluid obtained measures forty-two fluidounces; then, having mixed the alcohol with the wine, add them to the expressed liquid, and agitate the mixture several times at intervals of an hour or two; after which allow it to stand until the mucus which is precipitated by the alcoholic addition subsides, when the nearly clear solution of rennet may be drawn off with a syphon, and filtered for use. The wine may be substituted by a mixture of one part of alcohol and three parts of water. A tablespoonful of this solution readily coagulates a quart of milk to a firm curd, if added after gently warming the milk (to about 100° F.) stirring it well for a moment, and allowing it to stand undisturbed for half an hour or an hour. *Cold custard* is made in the same manner by previously adding a tablespoonful or more of sugar, and some vanilla or other flavoring before adding the rennet. When liquid rennet is employed for medicinal purposes, it is preferable to make it with wine, as being more acceptable to the stomach.

ON THE FORMATION OF AMMONIA BY MEANS OF WATER AND ATMOSPHERIC AIR.

By M. F. C. SCHOENBEIN.

The importance of the subject, in an agricultural and industrial sense, has induced us to give a complete analysis of this interesting work.

The author takes, as a starting point the observation made by him, about a year ago, on the combustion of phosphorus; he proved, in short, that nitrate of ammonia is formed by the slow combustion of that body.

The constant presence of nitrate of ammonia in rain-water led him to conclude that the formation of this salt was due to yet

other causes than to nitrogenised matters under decomposition, or to atmospheric electricity. The following is the first experiment which induced him to study more closely this interesting observation.

A platinum capsule was heated until a drop of water thrown into it was immediately converted into vapor without taking the spheroidal form. Perfectly pure water was used, and dropped so slowly, that one drop had evaporated before the arrival of a second. Above the capsule was a small inverted vessel in which the vapors were condensed. On examination, the water collected in this way was found to contain an appreciable quantity of nitrate of ammonia; in fact, when acidulated with sulphuric acid, it instantaneously colored blue starched iodide of potassium. Treated by caustic potash, it threw off white vapors when approached by a rod moistened in hydrochloric acid; turmeric paper placed above the vessel became brown.

Whether platinum, silver, copper, iron, or porcelain capsules were employed, the same result took place.

By using a copper alembic, much larger quantities of the liquid can be prepared. The empty alembic is made sufficiently hot to speedily vaporise the water without its taking the spheroidal shape. Small quantities of water were successively introduced, one portion being completely evaporated before the addition of another. The alembic was furnished with a Liebig's condenser, and the condensed liquid collected. A colorless neutral liquid was, in a short time, formed in the receiver, which gave to starched iodide of potassium, with the addition of a little pure sulphuric acid, an intense blue color, while it decolorised permanganate of potash.* This solution, decomposed by pure potash and evaporated to dryness, leaves a residue with all the characteristics of nitrite of potash. The solution of nitrite of ammonia cannot be evaporated without volatilising the greater part of this salt. In preparing the above solution it is difficult to guard against this kind of loss.

* We have found by experience how difficult it is to obtain sulphuric acid sufficiently pure, and giving no color to iodised starch solution. However, this is effected by purifying commercial acid from the nitrated compounds it contains, by M. Pelouze's process, which consists in boiling it with sulphate of ammonia.

When treated by sulphuric acid, this nitrite of potash residue disengages red vapors. When the liquid collected during distillation is acidulated with sulphuric acid, instead of being treated by caustic potash, sulphate of ammonia is obtained as residuum after evaporation. In this case, also, commercial acids must be distrusted, since they often contain ammoniacal salts.

In making various consecutive operations, the concentration of the liquids obtained varies greatly. The author attributes these variations to the differences of temperature, which it is difficult to fix. Diluted with 500 times their weight of water, these solutions often continue to give a blue color to starched iodide, while at other times the coloration is very faint, if not null.

Evaporation of Pure Water and Alkaline Solutions.

In pursuance of his researches, the author has remarked the formation of the same compound by the simple evaporation of pure water in a porcelain capsule. As proof, it is only necessary to suspend, over the evaporating vessel, papers impregnated with a caustic potash solution. In fifteen or twenty minutes these papers become colored by contact with the iodised reagent. Linen, well washed in pure water, may be used for the same purpose. The nitrite of ammonia formed during the evaporation of the liquid is carried off by the water vapor, and decomposed by contact with the alkaline liquids impregnating the linen or paper, and which are transformed into alkaline nitrites.

When, in place of caustic potash, the cloth is saturated with hydrochloric acid, the presence of hydrochlorate of ammonia can be shown. The same phenomena is observable when the evaporation takes place at from 40° to 70° C.; in this case, however, the cloth must be left for half a day in contact with the vapor.

A residuum containing nitrite of potash is obtained by evaporating a weak solution of potash, instead of pure water. Hence it is very difficult to prepare caustic potash, which imparts no color to the starched iodised sulphuric reagent.

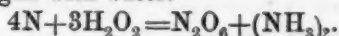
Nitrite of potash is formed also when the evaporation takes place in the open air, and at the ordinary temperature. Filtering paper, saturated with pure water, and dried in the open air,

becomes colored by the starched iodised reagent. All tissues dried in the air usually give the same reaction, as also does sand when washed and dried. In this state, treated with a small quantity of pure water, and then filtered, the filtered liquid produces the reaction of nitrites.

One hundred grammes of water, sheltered from dust, and evaporated in the air to 100th of the primitive volume, yields a liquid which disengages ammonia when treated by potash, and to starched iodide of potassium, with sulphuric acid gives an intense blue color.

It results from these experiments, that, whenever pure water, or an alkaline solution is evaporated, nitrite of ammonia is formed. After prolonged contact with the air, the nitrites or nitrates are visible on the surface of all bodies which have been dampened and dried in the air. The author has remarked the presence of nitrite of potash on the surface of glass, especially of roughed glass, which, by reason of its texture, retains more water, and dries more slowly.

Though unable to give a practical solution to this theoretical question, the author is of opinion that the formation of nitrite of ammonia can be explained only by the direct combination of atmospheric nitrogen with water:



He reserves the question, whether evaporation in the midst of pure nitrogen gives the same results, and whether it is necessary to effect the combination. However, he has remarked that in water left for several weeks in contact with the air, in closed vessels, the salt is not formed.

Nitrite of ammonia, being, as we have seen, formed by the concurrence of water and air and heat, it was probable that this product would be found in all products of combustion.

Combustion.

In 1845, M. Schoenbein observed that fatty bodies, as well as hydrocarbides, disengaged, during combustion, a body possessing oxidising properties, coloring starched iodised paper.

With the object of elucidating this matter, he constructed a small sheet-iron furnace, provided with a grate and a chimney. The gases produced by the combustion escape by the chimney.

If, by a proper disposition of the apparatus, the gases are made to pass over water, while wood charcoal is burning, the water becomes charged with nitrite of ammonia, provided always that the combustion be not too fierce. A small sponge, saturated with pure water, being suspended in the pipe served as a chimney, in a few moments the presence of nitrite of ammonia in the water in the sponge is easily recognisable.

The same results are obtained by suspending the sponge above an ordinary lamp, or in a chimney through which wood or coal smoke escapes. However, with coal rich in pyrites no reaction is observable, because sulphuric acid decomposes the salt of ammonia as it forms.

Nitrite of ammonia is not to be found in the products of combustion of bodies which, at the same time, form powerful acids.

The presence of ammonia can be recognised by burning phosphorus, under an inverted receiver, on a plate covered with water, until the water has a strong acid reaction. This ammonia proceeds from the decomposition of nitrite of ammonia in contact with phosphoric acid. The white vapors which form in the receiver are composed of nitrite, as is easily verified by suspending a sponge in them. The nitrous acid decomposes into binoxide of nitrogen and hyponitric acid.

Slow combustion of phosphorus causes also a disengagement of nitrite, which can be collected in a sponge saturated with water.

It is well known that arsenic, heated to about 200° , burns slowly while undergoing transformation into arsenious acid. If, at this moment it is introduced into an inverted receiver, and the operation repeated several times, the liquid becomes charged with ammonia. The air of the receiver contains no nitrous acid, as this acid will be decomposed; for the liquid containing the ammonia contains, at the same time, arsenic acid, formed seemingly at the expense of the oxygen and nitrous acid.

Even sulphur forms no exception. The liquid of the receiver contains sulphuric acid, sulphurous acid and ammonia.

Applications.

We have seen that nitrite of ammonia is formed, in many cases, of combustion; and it is probable that the same compound is formed in all cases.

The author ascribes the formation of this salt, not to the combustion itself, but to the concurrence of heat, water, and air.

He observes, that these results are of great importance to the theory of nitrification.

Chemists admit that nitric acid is formed by the oxidation of ammoniacal salts proceeding from nitrogenised matters, and that atmospheric nitrogen has nothing to do with it. While recognising all the importance of this remark, the author is of opinion that evaporation is the chief agent in nitrification.

Everywhere water is to be found evaporating, especially on the ground; nitrite of ammonia ought also to be found everywhere; and by contact with alkaline bases, alkaline nitrites are formed, which oxidise in the air, and are transformed into nitrates.*

In our rainy countries nitrites are carried away by the water, and, consequently, do not accumulate; but it is otherwise in hot countries, and especially in certain parts of the West Indies, where the dry season is of several months duration, and where there are to be found vast plains of alkaline earth.

The presence of nitrogenised matters is not a condition *sine qua non* of nitrification; nitrate of potash is formed in Bengal, in places where no nitrogenised matters exist capable of furnishing ammonia.

According to the author, attempts should be made to produce saltpetres artificially, aided by the data contained in this memoir.

The presence of ammoniacal salts in volcanic vapors, recently confirmed by M. Charles Deville's researches, should be ascribed, says the author, to evaporation only, for it is impossible to admit the presence of nitrogenised matters in volcanoes. Hydrochlorate of ammonia is formed by contact with hydrochloric acid and nitrite of ammonia. Disengagements of hydrochloric acid have likewise been observed by M. Deville.

The formation of nitrite of ammonia is of great importance

* The author has observed that the "pure" potash of the laboratory almost always contains nitrite, proceeding from the evaporation of alkaline solutions, as can be proved by dissolving it in water, and adding pure sulphuric acid and the starched iodised reagent. It is the same with sulphuric acid, and generally with water, distilled or not.

also in vegetable chemistry. Chemists have proved that plants cannot assimilate free nitrogen. To render assimilation possible, the nitrogen must exist in certain combinations; ammonia and nitrates are supposed to contain nitrogen in a suitable form. If such be the case, nitrite of ammonia, produced by evaporation, contains nitrogen in an assimilable state. Each plant itself a cause of evaporation, furnishes the portion of assimilable nitrogen necessary to it, whilst the salt is formed, in like manner, in earth moistened by rain.

Presence of Nitrite of Ammonia in certain Fluids of the Economy.

Saliva contains nitrate of ammonia. With addition of sulphuric acid, it colors starched iodide blue. Treated with potash, it throws off white vapors, by contact with hydrochloric vapors, and browns turmeric. These reactions, however, sometimes fail; but that may be caused by the presence in the saliva of sulphocyanide of potassium, which decolorises blue starched iodide. The color appears only when the nitrite is in excess.

This process is inadmissible for the detection of nitrite in urine, because this liquid has also the property of decolorising blue starched iodide, as M. Pettenkoffer's experiments prove:

The pituitary secretions show the reaction of the nitrites; but it varies in different persons, and is not always constant in the same individual. The presence of nitrite of ammonia in these liquids has not been previously observed.—*Verhandlungen der Naturforschenden Gesellschaft in Basel, from Lond. Chem. News, Novem. 15th, 1862.*

LINT PREPARED BY MACHINERY.

The *Scientific American* says that lint for hospital use may be prepared very rapidly by a carding machine.

Take any cylinder from six to ten inches in diameter, covered with common card clothing; lay an old card "doffer or lickerin" on the "strippers" of a wooden card; place it on a "grinder" frame, or even upon the centers of a common lathe, where a velocity of 600 or 800 revolutions per minute can be obtained; then take old table covers, napkins, sheets, &c., or any old linen

rags; and apply one end to the cylinder, holding fast with one hand to the other end; with the other hand press the goods on to the cylinder, guarding this hand by fastening a piece of belt leather to the palm, allowing the end of the same to project one-half an inch beyond the finger tips. Do not allow the cloth to lie upon the cylinder too far, as it will only tear the cloth or make a poor quality. One person, by this process, can produce more lint, and of a superior quality, than 5,000 can by scraping in the ordinary way, in the same time.—*Med. and Sur. Rep.*, October 4, 1862.

ON THE PREPARATION OF INORGANIC CARBON.

By GEORGE GORE, Esq.

Intimately mix one part of amorphous phosphorus and two parts of anhydrous carbonate of soda, both in fine powder; project the mixture, in small portions at a time, into a red hot clay crucible, keeping the crucible covered as much as possible, and not adding each fresh portion of the mixture until the white flame of burning phosphorus (which issues from a small hole in the cover) has quite disappeared. Digest the porous and cooled residue in water, filter, and wash until all alkalinity has disappeared. An abundant residue of exceedingly light carbon will be obtained, which, when dried, will be equal to about four-fifths of the calculated quantity, if the process has been carefully conducted and the crucible kept well covered.

A similar experiment made with anhydrous borax instead of carbonate of soda yielded no boron.

The following modification has on several occasions succeeded well as a lecture experiment:—Into a long and narrow test-tube, of German glass, place first a fragment of white phosphorus about the size of a large pea, then fill a length of about two inches of the tube with anhydrous carbonate of soda in powder; support the tube at its mouth in a horizontal position; heat the end of the carbonate most distant from the phosphorus to redness by a lamp, and then apply a moderate heat to the phosphorus by gradually shifting the lamp towards that end; the instant the phosphorus melts and volatilises, the whole of the red hot carbonate becomes quite black, and exhibits a striking contrast to its previous whiteness.—*London Chem. News*, Sept. 27, 1862.

PREPARATION OF OXYGENATED WATER, AND ITS
THERAPEUTICAL USE.

Dr. Ozanam gives the name of oxygenated water to water which is distilled and afterwards charged with oxygen under the influence of high pressure. The experiments he made have led him to establish three modes of operation by this new medicine. 1. It improves the condition of the blood in cases where that fluid is impaired or deficient, as in dyspnœa, asthma, slow asphyxia, cyanosis, diseases of the heart, hæmorrhoids, and hæmorrhoidal visceral congestion. 2. It possesses an oxidizing or metamorphic action in cases where the organic products are arrested in their development, as happens in glycosuria, gout, the uric and oxalic gravel, and perhaps in scrofula. 3. It exerts an exciting and regulating action on the brain and the thyroid gland, and hence its use in goître and cretinism. If, in fact, snow-water taken as drink gradually produces these morbid conditions, it is because it is entirely deprived of vital air. On the other hand, oxygenated water, as well as the inhalation of gaseous oxygen, produces no results in hemicrania, and unfavorable ones in cases of inflammatory disease. Thus, in croup, the oxygen temporarily tranquillizes the dyspnœa, but increases the fever. In the treatment of ulcerated cancer the oxygenated water revives pretty well the powers of the patient, and the wounds resume a more vivid and rosy color, but they do not heal; and if the surfaces are bathed with rags steeped in oxygenated water, even when very slightly charged, the ulcer is soon observed to become gangrenous on the surface. Oxygenated water is perfectly limpid and pure, and the gas is disengaged in the form of very fine bubbles. Having little taste, it resembles in this respect water which is deprived of air; and, like the latter, it is a little heavy for the stomach.—*B. and F. Med.-Chir. Rev.*, July, 1862, from *Compte Rendu de l'Acad. des Sc.*, Nov., 1861.

ON A SPURIOUS GLYCERINE.

BY HARRY NAPIER DRAPER, F. C. S.

I have recently had occasion to examine an article which, under the name of "German Glycerine," has found its way into

commerce, and, I have reason to believe, to a considerable extent. Apart from the importance of exposing a fraud which is at once the most ingenious and the most shameless which has ever come under my observation, it presents one or two points of interest.

This so-called "glycerine" is a semi-fluid mass, so viscid as to be with difficulty poured from one vessel to another, colorless, and perfectly, almost brilliantly, transparent. It is absolutely free from smell, and its taste is less sweet than that of pure glycerine as represented by the preparation of Price's Candle Company. It has a density of 1.436. (The specific gravity of anhydrous glycerine is 1.270; of Price's, 1.240.) This high density was of itself sufficient to show that this substance could not be pure glycerine, and it was further examined, with the following results:—

Evaporated at a temperature sufficient to cause ebullition, it gave off watery vapor, and, on cooling, solidified into a transparent brittle mass.

At a higher temperature this solid fused, became colored, and was finally converted into a shining black substance, easily recognisable as caramel.

Boiled with solution of potash, it gave a brown liquid.

Heated with a few drops of solution of sulphate of copper and excess of potash, an immediate and abundant precipitate and suboxide of copper was produced.

Largely diluted with water, and placed in contact with yeast at a temperature of 60° F., active fermentation rapidly set in, alcohol and carbonic acid being produced.

These results placed beyond doubt that the "glycerine" consisted, if not wholly, at least in great part, of a concentrated solution of glucose, but it still remained to be decided whether *any* glycerine was present. Now, while I am, for my own part, satisfied that it does not contain glycerine, it is by no means easy to demonstrate the entire absence of this body.

That, however, glucose forms by far the greater part of the syrup, is shown by its becoming solid on evaporation, by the transformation of apparently the whole of this solid into caramel, and by the fact that, when the glucose had by fermentation

been converted into alcohol, glycerine could not be detected in the evaporated residue. Pure glycerine, largely diluted with water, and left in contact with yeast for the same time, and under like circumstances of temperature, &c., underwent no change. It was necessary to make this experiment, as glycerine is, at a somewhat higher temperature, converted by yeast into propionic acid.

An attempt to detect the presence of glycerine, by taking advantage of its ready solubility in absolute alcohol, was unsuccessful, as the residue from the evaporation of the alcohol proved to be uncrystallisable grape sugar.

I had hoped that the absence of the characteristic odor of acrolein, when the mass resulting from the evaporation of the syrup was heated with anhydrous phosphoric acid, would have been a conclusive proof of the absence of glycerine; but it was found to be practically impossible to recognise this odor in the presence of the irritating vapor evolved during the caramelisation of glucose.

My reason for thinking it probable that some glycerine was present was this:—I thought it likely that it might be used for the purpose of preventing the crystallisation of the glucose; but I am now of opinion that the syrup consists of the uncrystallisable modification of this sugar.

It would be very interesting to learn the exact process by which a solution of uncrystallisable sugar, so free from color and so transparent, was obtained; as, from its great density, it would doubtless prove valuable in preserving many substances which, like iodide of iron, are easily oxidised.

If it be found, on further experiment, that glycerine suffers decomposition in contact with yeast and glucose, at the lowest temperature sufficient for the fermentation of the latter, a reliable mode of detecting very small quantities of glycerine in the presence of this sugar will still be a desideratum. Since, however, the above experiments were made, it has been suggested to me by my friend, Professor Galloway, that a modification of the method of Fehling might be used for the isolation of glycerine under these circumstances.—*London Chem. News*, Oct. 25, 1862.

STATISTICS AND ASSAYS OF "VIRGIN SCAMMONY."

By EDWARD R. SQUIBB, M. D., Brooklyn, N. Y.

Scammony may be easily obtained in the ordinary drug market at prices varying between fifty cents and eight dollars per pound, and is occasionally met with at nine to twelve dollars per pound. The so-called "virgin scammony," however, in several varieties as "Tchangaree," "Beybazar," etc., ranging between six dollars and fifty cents and twelve dollars per pound, is confined to a few importers, and is not always to be found in quantity. During the years 1860 and 1861, and the first half of 1862, at least one thousand pounds of "virgin scammony" were met with in the New York market, and carefully examined by the writer, the results being noted.

It generally occurs in soldered square tin boxes, containing twenty-five to twenty-eight pounds each, four such boxes being packed in a wooden box for transportation. Occasionally, however, it is seen in round wooden boxes or drums of a similar capacity. The scammony is in irregular, rough and fissured masses of various sizes, sometimes porous, but commonly solid, hard and semi-resinous, having a tough, dull fracture. It is of a very dark grayish green color internally, often nearly black, but more of an ash color externally. It is rarely dry enough to be pulverulent, yet still more rarely too moist to be rubbed into coarse powder, and it generally loses six or seven per cent. in drying sufficiently to make a fine powder. The amount of moisture is, however, very variable, and thus has great influence upon the percentage of resin.

The appearance of this scammony is tolerably uniform, and it has not a single sensible property which can be relied upon as indicating its true value. The usual mode of assaying it is to select a specimen, rub it to powder, weigh the powder, wash it two or three times with ether, dry and weigh the residue, and having subtracted its weight from that of the powder, to call the remainder resin of scammony. This method is not only very inaccurate, but is fraudulent in the results, because all the mois-

ture is knowingly stated as resin of scammony. It is, however, still used to sell by, despite of a knowledge of its inaccuracy.

The method of assay used by the writer, and believed to be simple, easy, and practically accurate, is as follows: Take a very small piece, from one-third to one-half of the lumps of the package, and a little of the dust that is rubbed off by attrition during transportation, and found at the bottom of the box. Powder the whole of this sample, and pass the powder through a small sieve of coarse bolting cloth. If only that portion of the powder, which first and most easily passes through the sieve, be taken, a false result will be obtained; or, if the sample be allowed to lie for a day or two, either powdered or unpowdered, before being weighed off for the assay, the results will be inaccurate from loss of moisture. Mix the whole powder thoroughly, weigh off from it five grammes, put this into a vial of the capacity of 50 cubic centimetres, (29.52 c.c. to the f.3,) fill the vial two-thirds full of strong ether, cork and shake it well, and then allow it to settle until the solution becomes clear. Decant the clear solution as closely as possible into a tared capsule, fill the vial again with strong ether, and proceed as before. Repeat this washing with ether a third time, and having collected the clear solutions in the capsule, evaporate them to dryness, and carefully heat the residue in the capsule in a hot air bath to somewhat over 212°. When cold weigh the capsule and contents, subtract the tare and note the remainder as resin of scammony, if the scammony be not adulterated with any other resin. The rule of simple proportion will then give the percentage of the resin, and consequently the true value of the scammony.

Within the period before-mentioned, thirty-four packages of "virgin scammony," representing more than one thousand pounds, have been assayed by the writer, and the results of these are given in tabular form below. At least one-third of the whole number of these parcels were purchased by the writer upon the assays made, and the resin extracted for making compound extract of colocynth; and in these cases the results of the assays were commonly found to be from one-half of one per cent. to one and a half per cent. too low. This may be accounted for by the extraction on the large scale having been made with 95 per cent.

alcohol instead of ether, while the general results show the practical accuracy of the method of assay.

No. of the Assay.	Date of the Assay.	Source from whence the Scammony was obtained.	Per centage of Resin of Scammony.	
1	1860, Feb. 20,	Schieffelin Brothers & Co.	33.3	Special Importation.
2	Mar. 15,	Jas. S. Aspinwall.	54.9	
3	Oct. 26,	Merrick & Bull.	57.0	
4	" "	Schieffelin Brothers & Co.	33.5	
5	" "	Lazol, Marsh & Gardner.	56.0	
6	" "	Jas. T. Maxwell.	57.1	
7	" 23,	" "	72.1	
8	1861, Jan'y 22,	Schieffelin Brothers & Co.	65.9	
9	April 18,	Merrick & Bull.	58.0	
10	May 7,	Schieffelin Brothers & Co.	68.3	
11	July 19,	Jas. S. Aspinwall	28.9	Special Importation.
12	" "	" "	31.5	
13	" "	" "	29.7	
14	" "	" "	32.2	
15	" "	" "	30.0	
16	" "	" "	32.4	
17	" "	" "	41.6	
18	" "	" "	27.9	
19	" 20,	Merrick & Bull.	59.5	
20	Aug. 3,	Schieffelin Brothers & Co.	47.0	Special Importation.
21	Dec. 20,	Merrick & Bull.	79.7	
22	1862, Mar. 26,	Schieffelin Brothers & Co.	28.8	
23	" 30,	" "	30.3	
24	" "	" "	29.3	
25	" "	" "	30.5	
26	May 23,	" "	73.1	
27	" "	" "	62.4	
28	" 30,	Jas. S. Aspinwall.	69.7	
29	June 1,	Schieffelin Brothers & Co.	68.8	
30	" 24,	Merrick & Bull.	45.8	
31	July 26,	Schieffelin Brothers & Co.	42.6	
32	Aug. 13,	Merrick & Bull.	31.7	
33	" "	" "	48.6	
34	" "	" "	25.0	

The assay No. 7 was from a box imported by Mr. James T. Maxwell at the special request of the writer, without limitation in price, and cost here twelve dollars a pound.

The assay No. 21 was from a special importation of four boxes by Messrs. Merrick & Bull, without limitation of price that the writer is aware of. The quantity was 110½ pounds, and the cost was \$10.75 per pound. This quantity required 60 gallons of 95 per cent. alcohol to exhaust the powder, and yielded 87½ pounds of resin of scammony. Taking the cost of drying and powdering the scammony, the labor of extraction, the cost of materials used, and an estimated wear and tear of apparatus, etc., the neat prime cost of this resin was \$14.21 per pound, or about 89 cents per ounce. This is about the average cost of the resin, but is obtained with less trouble the higher the grade of the scammony. It is, therefore, more economical to buy the higher priced scammony.

The last assays and purchases, though of lower grade of value, were at higher prices from the high rates of exchange and the high tariff, and it is probable that after this time the advance will be still greater, so that the scammony represented in the table will hereafter be obtained only at ten to fourteen dollars a pound.

The regulations of the Treasury Department, under the Act of Congress of 1848, "To prevent the importation of adulterated and spurious drugs and medicines," specify that "scammony, when affording 70 per cent. of pure scammony resin," is alone entitled to entry into the United States. See "Regulations under the Revenue Laws, 1857," published by the Treasury Department, p. 158. From this it appears that while it is legally impossible to have imported scammony in this market below 70 per cent. yet, that in fact only three samples out of thirty-four, representing one hundred and fifty pounds out of a thousand, could be found within a period of two and a half years, which really came up to the legal standard; and two of these, representing one hundred and twenty-five pounds, were special importations to order, and would not otherwise have come here. These facts constitute a severe criticism upon the way in which the "drug law" has been executed with regard to a very important drug, and one which is very easily tested. The facts also show that when good scammony is wanted it can, under ordinary circumstances, be obtained at a price nearly corresponding to its true value.

These facts also show conclusively what degree of therapeutic uniformity is to be expected from the use of the best grades of scammony to be found in the market; and the propriety of the step taken by the Committee of Revision of the Pharmacopœia in substituting resin of scammony for scammony in the official compound extract of colocynth. The scammony of the forthcoming revision of the Pharmacopœia is required to contain not less than 75 per cent. of resin of scammony to entitle it to be considered officinal.

It appears extremely probable that in the countries where scammony is produced, there is a kind of standard of adulteration, as in the instance of opium, and perhaps other drugs,

whereby it is kept within the limits of 45 to 65 per cent., and that higher and lower grades are produced to order, or, which is the same thing in effect, to suit the price limitations which are almost invariably sent out with the orders of the importers.

The statements of the best authorities concur in giving for the concrete juice of the living scammony plant, when properly dried, a proportion of resin varying from 80 to 92 per cent., and it is highly probable that the importers could, if they would, obtain the drug in this condition.—*Proc. Amer. Pharm. Asso.*, 1862.

Brooklyn, August, 1862.

ON OIL OF SASSAFRAS.

By A. P. SHARP, of Baltimore.

“What are the principal sources of Oil of Sassafras, its mode of manufacture and the quantity produced annually?”

In answer to the above queries I will state, that upon enquiring among the leading drug houses of New York and Boston, I was informed that their chief supply was obtained from Baltimore, hence I have confined myself in obtaining information in regard to the oil more particularly to that city, although I am informed that considerable quantities of it are carried into Philadelphia from New Jersey, and from York and adjoining counties of Pennsylvania. It is brought into Baltimore by small farmers and laboring men who reside in Baltimore, Carroll and Frederick counties, in quantities varying from fifty to five hundred pounds, and purchased by the wholesale drug houses and agents of northern firms for shipment there.

The mode of manufacturing which I have obtained from different persons engaged in the business, is very simple. The roots are dug during the fall and winter, and after being cut into small pieces are placed in a large tub, (or perhaps, more properly speaking, still,) constructed of oak staves and iron hoops, and usually of the following size: six to seven feet high, six and a half feet diameter at base tapering to five feet at the top, upon which is fitted an ordinary helm connecting with the condenser, which is the common copper worm. The tub has resting a few inches above the

main bottom a false perforated bottom upon which the cut root is placed, until the tube is filled with it, and the helm and condenser properly connected, when a stream of steam from any common boiler is introduced, between the two bottoms; this in ascending carries with it the oil, which is condensed in the ordinary manner. The usual yield is one pound of oil from three bushels of the cut root. The quantity brought to market the last year or two has diminished very much from former years, for several reasons. Firstly, the price of the oil became very much reduced, and the increased price of labor induced many to give it up for more profitable employment; and secondly, many of the producers, of the oil have joined the army, and hence the amount of oil brought to the market has fallen off very much. I have, however, endeavored to obtain all the information possible, as to what the yield has been on the average for several years previous to our present troubles, and the amount will reach from fifteen to twenty thousand pounds.

There is another fluid obtained from the root by distillation, on which I hope to give the result of some experiments at our next meeting.—*Proc. Am. Pharm. Association*, 1862.

ON SOME COMPOUNDS OF THE ALKALOIDS OF CINCHONA BARK.

O. Hesse publishes in *Annal. d. Ch. und Pharm.* 1862., May, 226–240, an interesting paper on *Cinchonia*, wherein he compares Schwabe's betacinchonia (see *Amer. J. Ph.* 1861, 417) with cinchonia prepared from bark directly, and from chinoidine, and believes them to be identical. Below we give the most important results.

Cinchonia dissolves at 10° C. in 3810, at 20° in 3670 parts of water. Ether of .7305 spec. grav. takes up at 20° one for 871 parts, while 140 p. alcohol of .852 dissolves at 10°, and 125.7 parts at 20° one part of the alkaloid. Ammonia precipitates it from its solutions in acids, and when dilute, dissolves so little of it that it may be used for the estimation of cinchonia, which after its precipitation is washed with weak ammonia, saturated with cinchonia. Cinchonia, like Schwabe's betacinchonia, is not precipitated by bicarbonate of soda in the presence

of tartaric acid; when heated, however, carbonic acid is given off and cinchonina separated.

Some neutral salts of cinchonina are decomposed by water, particularly when heated; as, for instance, the citrate and acetate. This decomposition of its salts with organic acids on heating must be regarded as the cause why cinchona barks yield a carmine red sublimate. Batka's supposition that they contained the alkaloids in an uncombined state, is without foundation.

The fusing point of cinchonina is generally given at 165° C.; Schwabe found his alkaloid to fuse at 150° , Erdmann states it to be at 160° . The author observed no alteration of the crystallized alkaloid at 165° ; a portion sublimed at and above 220° , and the remainder fused between 240 and 250° to a brownish liquid, congealing on cooling; the amorphous alkaloid behaved alike.

a. Salts obtained by treating cinchonina in excess with dilute acids.

Hydrochlorate. The crystalline form and the composition of the air-dry salt was the same as Schwabe's. It dissolved in 24 p. water of 10° , 1.3 p. alcohol sp. gr. .85 at 16° , and 273 p. ether sp. gr. .7305 at 16° C. Dried in the exsiccator it loses 3 aq., and at 100° becomes anhydrous.

Nitrate forms on spontaneous evaporation of the aqueous solution large crystals, but separates after heating, in oily drops; it dissolves in 26.4 water of 12° C. and has the composition $C_{40}H_{24}N_2O_2, NHO_6 + HO$.*

Benzoate crystallizes on cooling of the boiling aqueous solution in small anhydrous prisms combined in stellate groups, soluble in 163 water of 15° .

Sulphate, $C_{40}H_{24}N_2O_2, SHO_4 + 2$ aq. dissolves with difficulty in 75 to 78 water; a hot solution remains supersaturated for a long time after cooling; at 13° C., 65.5 water retain 1 part of the salt in solution, and 5.8 parts of 80 per cent. alcohol at 11° the same quantity.

* The formula for the nitrate and sulphate, in Schwabe's paper, Am. Journ. Ph. 1861, page 420, must be corrected to correspond with the above. Hesse doubles the formula for the sulphate, regarding sulphuric acid = $S_2H_2O_6$, which is bibasic.

Phosphate occurs in concentric groups of prisms, very readily soluble in water, its composition = $2C_{40}H_{24}N_2O_2, PH_3O_8 + 24 \text{ aq.}$

b. Salts obtained by treating cinchonia with an excess of acid.

Acid tartrate, $C_{40}H_{24}N_2O_2, C_8H_6O_{12} + 8 \text{ aq.}$ already prepared and analyzed by Pasteur, dissolves in 101 water of 16° C. , which solution has an acid reaction, and is not troubled by bicarbonate of potassa in the cold.

Acid citrate, $2C_{40}H_{24}N_2O_2, C_{12}H_8O_{14} + 8 \text{ aq.}$ forms small prisms, soluble in 55.8 water at 15° C.

Acid succinate crystallizes from water, partly in long oblique needles, $C_{40}H_{24}N_2O_2, C_8H_6O_8 + 3 \text{ aq.}$ partly in large thick crystals of a similar combination of faces, $C_{40}H_{24}N_2O_2, C_8H_6O_8 + 2 \text{ aq.}$ Both are very soluble in water, have an acid reaction and fuse at 110° to a dark red mass.

c. Salts obtained by double decomposition from the aqueous solution of the muriate.

Hydriodate separates on cooling, as a pale yellow oil, which soon becomes crystalline, and partly in tender white crystals, both of which have the composition already ascertained by Regnault $C_{40}H_{24}N_2O_2, HI + 2 \text{ aq.}$

Hydrocyanate, prepared by Schwabe's direction, possesses the properties described by him, but contains no hydrocyanic acid; the precipitate is cinchonia.

Hyposulphite, $2C_{40}H_{24}N_2O_2, S_2H_2O_6S_2 + 4 \text{ aq.}$ crystallizes in fine white rhombic prisms, and dissolves at 16° C. in 157 water.

Oxalate, $2C_{40}H_{24}N_2O_2, C_4H_2O_8 + 4 \text{ aq.}$ crystallizes in prisms, and dissolves in 104 water of 10° .

Tartrate, $2C_{40}H_{24}N_2O_2, C_8H_6O_{12} + 4 \text{ aq.}$ prepared and analyzed by Arppe, is in small crystals which dissolve at 16° in 33 water. It differs from the acid salt in absorbing again from the air its water of crystallization, expelled by heating; in fusing with greater difficulty, and in the faint alkaline reaction of its solution.

Citrate separates from the alcoholic solution as a colorless oil, congealing to long prisms, arranged in concentric groups, con-

taining $3C_{40}H_{24}N_2O_2, C_{12}H_8O_{14} + 8$ aq. and dissolving in 48.1 water of 12° C.

Arsenate is in long white prisms, and very soluble in water; composition like the phosphate.

Chromate, $C_{40}H_{24}N_2O_2, HO, Cr_2O_6$ crystallizes from moderately warm solutions in small ocher-yellow prisms, which are decomposed by the light while moist, but are not affected by it in the dry state. From hot solutions the chromate separates as a resinous mass.

d. Salts prepared in different ways.

Tartrate of antimony and cinchonia was obtained by decomposing equivalent weights of sulphate of cinchonia with tartrate of antimony and baryta. On spontaneous evaporation, white crystalline warts are separated first, afterwards large crystals resembling nitrate of cinchonia. These different forms depend on the water of crystallization, the former containing 24.77, the latter 9.94 per cent. Dried at 100° C. they contain 26.40 Sb and 47.48 cinchonia.

Dr. O. Hesse has obtained a crystalline compound of oil of anise with quinia, which separates from the concentrated alcoholic solution of 5 parts of quinia and 1 of oil of anise, and becomes pure and colorless by recrystallization and treatment with animal charcoal. At ordinary temperature, the crystals scarcely smell of anise, but the odor becomes more apparent with a higher temperature, and between 100 and 110° C. the oil of anise is entirely expelled, together with $4HO$. Muriatic acid converts it into a flocculent or oily mass and combines with the quinia; cold water has no action, but below its boiling point the crystals fuse in it, and oil of anise is expelled; the dry compound fuses above 100° C. It is very readily dissolved by ether and left on evaporation in the form of prisms and tables. Cold alcohol dissolves but little, boiling alcohol very readily, and separates it on cooling in acute four-sided double pyramids with all the corners cut off. The taste reminds both of quinia and anise. The analysis leads to the formula $2C_{40}H_{24}N_2O_4, C_{20}H_{12}O_2 + 4$ aq.

Analogous compounds of quinia with carbolic acid, creasote, camphor, oil of peppermint, caraway and roses could not be obtained. (Ann. d. Chem. und Ph. 1862, Sept., 382—384.)

R. Hoffmann's process for the introduction of oxygen into the molecule of acetic acid, consists in substituting 1H by 1Cl, Br or I, and replacing the halogen with HO_2 by treating with KO or AgO. Hermann Strecker has endeavored to *oxidize cinchonia* in this way to quinia. He converted muriate of cinchonia into bibromocinchonia, the alcoholic solution of which was boiled with oxide of silver or potassa; the excess of potassa was then neutralized with carbonic acid, the solution evaporated, and the soluble salts dissolved in water. Ether took up but little from the residue, which was recrystallized from hot alcohol and yielded colorless laminæ. Elementary analysis proved the composition to be $\text{C}_{40}\text{H}_{24}\text{N}_2\text{O}_4$.

The base is readily soluble in acids, which solutions do not fluoresce, and yield no green coloration with muriatic acid (undoubtedly a mistake; must read chlorine water) and ammonia. The neutral sulphate and oxalate crystallize readily, the other salts with difficulty; acid salts could not be obtained in a crystallized state.

All the experiments proved the base to be isomeric with quinia and quinidia, but distinct from both; the author has named it *oxycinchonia*. (Ibid. 379—372).

J. M. M.

ACCLIMATIZATION OF SPONGES.

M. Lamiral, whose departure for the coast of Syria with a view to obtain sponges for transplantation we mentioned in April last, has now returned, and presented a detailed report of his proceedings to the Société d'Acclimatation. M. Lamiral distinguishes three kinds of sponges for which there is a demand—the fine soft sponge, called *abiand*; the fine and hard sort, called *achmar*; and lastly, the common sort, called *cabar* by the Arabs. These sponges are found in the Levant within the 36th and 33d degrees of latitude; that is, between Alexandretta and Saida. It is now universally acknowledged that sponges belong to the animal kingdom, and are an aggregate of cellules built up by gelatinous polypi similar to those which construct madreporæ, porites, and other polypifers. When the sponge is first gathered at the bottom of the sea, it is covered with a black but transparent gelatinous substance, resembling vegetable

granulations, among which microscopic white and oviform bodies may be distinguished. These are the larvæ destined to perpetuate the species. When arrived at maturity, they are washed out by the sea-water which incessantly flows through the sponge; they then swim along, by the aid of the vibrating cilia or hairs with which they are provided, until they reach a suitable rock, to which they attach themselves, and there commence a new life. This emigration of the larvæ from the parent sponge occurs about the end of June and the beginning of July. The fine quality of sponges are chiefly found at the depth of fifteen fathoms or thereabout; the common sponge lies at depths varying between twenty and thirty fathoms. At Tripoli (on the coast of Syria, not of Africa) M. Lamiral engaged some divers, who commenced operations on the 21st of May. The sponges gathered were immediately placed in boxes, through which a stream of sea-water was constantly made to flow, the animal matter being, of course, left on them, and protected from injury. These sponges arrived at Marseilles on the 17th of June; thence they were taken to Toulon and the islands of Hyères, where stone troughs, with five sponges in each, were sunk in different places. The success of the experiment will not, of course, be known until next season.—*Phar. Jour. Lond.*, October, 1862, from *Times*, Sept. 26th.

ON THE EXISTENCE OF ANILINE IN CERTAIN FUNGI, &c.

By DR. T. L. PHIPSON, F. C. S., &c.

In this paper the author refers to some experiments upon the action of organic matters upon oxygen, which he published about two years ago, and which tend to show that, whenever an organic substance is oxidised in nature, the oxygen is in the state of ozone. This state is excited by the presence of a ferment. For instance, when an apple is cut in two halves, the tissue exposed to the air becomes brown in a short time; this coloration is owing to ozone acting upon the tissue. Ordinary oxygen will not produce it; moreover, the presence of a ferment in the tissue is necessary to ensure the transformation of oxygen into ozone. If a solution of guaicum, or of iodide of potassium and starch, is placed upon the freshly-cut surface of

the apple, these reagents immediately show the presence of ozone. If the apple be heated to 100° C., so as to destroy the ferment, no ozone is formed, and the coloration will not occur. The author then proceeds to examine the cause of the coloration of certain fungi (*Boletus luridus*, *Boletus cyanescens*, &c.), which become blue when they are cut and exposed to the air. This coloration is also due to the action of ozone, induced by the presence of a ferment; and the substance upon which the ozone acts appears to be acetate of aniline. Alcohol extracts the latter, together with a variety of other substances, which, however, do not prevent the characteristic reactions of aniline, such as the action of chloride of lime, &c., to be distinctly obtained with this liquid. When the fungi are previously boiled to destroy the ferment, no ozone is formed in contact with the air, and, consequently, no coloration occurs. The author states that Professor Schoenbein first remarked that ozone was active in the coloration of these fungi.—*Chem. News, Lond.*, October 18, 1862.

ON THE CULTIVATION OF EGYPTIAN OPIUM.

BY MR. S. STAFFORD ALLEN.

In the course of a voyage on the Nile last winter, an opportunity was afforded of examining the process of manufacturing Egyptian opium, and though the whole affair is so simple and previously well-described as to be scarcely worth mentioning, the observation of an eye-witness may possibly interest some of your readers.

The town of Gheuch is situated on the Nile, about 400 miles above Cairo, and celebrated for the manufacture of the earthen "goollehs," a sort of porous water-bottle much in use throughout Egypt.

Near this place I observed several fields (mostly small) of white Poppies (*Papaver album*), which I was informed were grown for Opium; and being curious to see the process by which this important article is produced, I paid a visit to one of them.

The poppy itself is called by the Arabs "Abou Nome," or the "father of sleep" (the term "abou" being generally used

in the Arabic language, in conjunction with any remarkable quality or feature, to indicate a person or thing.) The opium itself is distinguished by the name of "fiuw." As soon as the head has attained a good size, and before it has begun to dry, a long incision is made with a knife, running twice round it in a horizontal direction. From this incision a yellowish milky fluid exudes, in the form of small tears, becoming darker and harder by exposure to the sun.

This is collected every morning on a sort of rough scoop knife (all tools in use amongst the Arabs being of the rudest description,) and the produce of several gatherings added together on a leaf, where they form a flat cake, which is then placed in the sun to harden.

Each head is scraped four or five times, after which it is exhausted, and is then cut and dried for seed.

The quantity procured from each head is almost infinitesimal, and the amount of a whole day's gathering exceedingly small.*

The opium manufactured here is not exported, and no more is grown than is required for home consumption.

Professor Bentley stated that the opium forwarded by Mr. Allen was unlike the ordinary commercial Egyptian opium. The present was covered by a poppy-leaf, whereas commercial Egyptian opium was enveloped in a leaf with radiate veins, the origin of which was unknown, but which he believed was derived from *Platanus orientalis*. The present specimen much resembled the small Constantinople opium in flat cakes of Guibourt (see Pereira's *Mat. Med.* 4th ed. vol. ii. part 2, page 600.)—*Phar. Jour. Lond.*, Nov. 1862.

ON THE PREPARATION OF METALLIC BARIUM.

BY WILLIAM CROOKES.

In the last number of the *Philosophical Magazine* will be found a note by Mr. C. W. Vincent on the preparation of chromium, and one by Mr. W. B. Giles on the preparation of manganese; the reduction in each case being effected by allow-

* A specimen of opium procured at the above-mentioned place accompanied this paper.

ing sodium-amalgam to act upon an aqueous solution of the respective chlorides, removing and drying the new amalgam which forms, and then distilling off the excess of mercury. It may be interesting to know that this method is capable of very general application. Not only can salts of most of the heavy metals be reduced to the metallic state in this way, but also those of the alkaline earths. The preparation of barium is especially easy. To a saturated aqueous solution of chloride of barium sodium-amalgam is added. The whole is then heated to about 200° F., and in a few minutes the replacement of sodium by barium will be complete. Scarcely any gas is evolved, but the amalgam increases in bulk, becomes of an iron-grey color, and, upon examination with a lens, is seen to consist of a mass of glistening metallic crystals. In order to make sure of the removal of the whole of the sodium, the supernatant liquid may be poured off, and the amalgam boiled with fresh chloride of barium. A little hydrogen will now be evolved, and the barium amalgam must be transferred to a dish of water, and kneaded with the fingers under a tap for a minute or so, to get rid of salts. It must be dried and squeezed in a cloth, to remove excess of mercury. In this state barium amalgam forms a very heavy crystalline mass, which, when kneaded between the fingers, has very little cohesion, but breaks up with a grating sound into a crystalline powder; it tarnishes slowly in the air, and decomposes water.

To prepare the pure metal from this, it is placed in a hard glass tube retort, and covered with naphtha, the open end of tube being nearly closed by a cut cork; the naphtha and the mercury are then distilled off, the heat towards the latter part of the time being raised to redness by a blow-pipe. The barium rapidly attacks the glass at this temperature, and if this temperature be maintained too long the resulting metal will contain silicium. The tube is then allowed to cool, and the end cut off. The metallic barium will form a fused mass at the end of the tube; it must be quickly removed to naphtha, as it appears to tarnish as readily as potassium. To get the true color of the metal it must be scraped under naphtha; it will then be seen to possess a brilliant white, metallic lustre. Exposed to the air for even a few minutes, it crumbles to powder, which gradually becomes white, consisting then of baryta; thrown into

water it sinks instantly, evolves hydrogen violently, and forms baryta-water. When heated in a spirit-lamp it burns like iron filings, the light being a mixture of red and green. The properties of the metal are in these, as well as in other, respects, identical with those given by Sir Humphrey Davy.—*Chem. News, Lond., October 18, 1862.*

PHOSPHOMOLYBDIC ACID AS A TEST FOR ALKALOIDS
IN MEDICINAL PREPARATIONS.

BY FRED. F. MAYER, of New York.

As one of the questions allotted to me at the meeting of this Association in 1860, stands on your list an inquiry into the practicability of a volumetrical assay of the narcotic extracts by means of the test known as phosphomolybdic acid, generally called Sonnenschein's test, and the paper which I present to you at this meeting is an attempt at a reply thereto.

At the time when I undertook this reply, I was not aware that another chemist had been engaged on the same subject, and in the same direction, nor what results he might have arrived at. But as I was informed last year by Prof. Maisch, a pupil of his in Philadelphia, Mr. Hayes, of Georgia, had undertaken to examine the value of phosphomolybdic acid for the same purpose. Prof. Maisch could not, however, give me any data as to the conclusions Mr. Hayes had arrived at, and being unable to communicate with the gentleman, as well as unwilling to deprive him of the merit belonging to him, I concluded upon entering only into a general examination, the more so as I have never been very favorably impressed with any belief in the practicability of the test for volumetrical analysis.

For, the relative value of a method of wet assay depends not so much on the extreme nicety of the reaction which is required in chemical analysis by weighing; but in the readiness of the means with which the reaction is brought about. Another requisite of a volumetrical method is that the assay be not interfered with by other ingredients of the liquids acted on, which might produce similar results or render the reaction indistinct.

It always appeared to me that phosphomolybdic acid was inapplicable for every one of the reasons just given.

This compound was introduced by Struve and Savanberg, as a test for the presence of ammonia in acid liquids, and to this day is used for this purpose, as is the molybdate of ammonia in testing for phosphoric acid. Its preparation, quoting Sonnenschein, is as follows:

"Molybdate of ammonia is precipitated by common phosphate of soda; the yellow precipitate, after being well washed, is suspended in water and heated with carbonate of soda until dissolved. This solution is then evaporated to dryness, and calcined to drive out every trace of ammonia. In case the molybdic acid should in part have been reduced during this process, the whole must be moistened with nitric acid, and again calcined. The resulting salt, when cool, is then warmed with water; nitric acid is added in excess, and the strongly added solution diluted with water, in such a proportion that the resulting liquor should contain 10 per centum of the dry salt. The golden colored liquid must be kept from the influence of ammoniacal vapors."

After this reagent had been established by Sonnenschein as a test for ammonia or any of its salts, De Vrij, in 1853, first noticed that it produced a similar reaction, not only with ammonia, but also with alkaloids, and in 1857, Sonnenschein without crediting De Vrij, published the same as an extension of the original test, for the determination of the amid-bases derived from ammonia, as well as all the alkaloids, which had come under his observation, (*Ueber ein neues Reagens auf Stickstoffbasen, Berlin, E. Kuhn, 1857,*) and an abridged account of his paper was republished in the *London Pharmaceutical Journal*, and the *American Journal of Pharmacy* for 1858.

As regards delicacy of reaction this test leaves nothing to be desired, and is in this regard exceeded only by Scheibler's metatungstic acid.

Not to mention, however, the costliness of the reagent in either case, which would in itself be sufficient to preclude its adoption for general analysis, there is one great objection to its use, and this objection in all probability has prevented Sonnenschein from giving the quantitative application of the test which

he promised when publishing the qualitative—it is, that a precipitate with phosphomolybdic acid always leaves us in doubt as to whether it be caused by an alkaloid or by ammonia, or one of its compounds; appearance, texture and color in nearly all cases differing very little, which difference in colored solutions amounts to nothing.

This I consider the fatal objection to the reagent in its application for the testing of narcotic extracts. An extract containing as much of a salt of ammonia as it should of its proper alkaloid, if phosphomolybdic acid were used for quantitative precipitation, would show the same strength as a good extract. There would therefore be no safeguard against error or fraud. But it is a question as yet whether of all narcotic extracts, and extracts generally containing nitrogenous compounds, ammonia or some of its salts does not form a constituent.

We know how liable the alkaloids of Belladonna, Stramonium, Conium and Hyoscyamus, are to decomposition during their preparation, and that ammonia is always a product of such decomposition; and it may be safely assumed that it is a constituent of all narcotic extracts—preparations which have to undergo so much manipulation and exposure to extraneous influences.

An experiment made in this direction gave me a doubtful result; but as the method employed is capable of improvement, and the point well worth examining, I can only promise to continue the experiments.

A few grammes of Extr. Belladonnæ (English) diffused in water, were mixed with dilute caustic soda lye, and placed in a flask, through the cork of which passed first a tube conveying a current of washed hydrogen gas; and secondly, a tube provided with a large bulb, the upper end of which was connected with a bent tube passing into a flask with dilute nitric acid.

The purpose was to obtain, if possible, the most volatile product of the action of the caustic alkali on the extract in an atmosphere of less density than that of the atmospheric air, free from the products of that action at a higher temperature; the bulb tube to retain anything condensable, other than gas.

Belladonna and its extract, when mixed with a fixed alkali, evolves an odor closely resembling that of conia. The current

of gas after passing through the bulb tube, but before reaching the acid, possessed the same odor and gave white fumes with acetic acid, and the nitric acid into which the gas was afterwards conducted for a considerable length of time, gave a faint reaction with phosphomolybdic acid. The question is therefore unsettled, whether these fumes with acetic acid arise from ammonia, or from the substance which causes the narcotic odor of the extract and of impure atropia; and my experiments in that direction are not yet concluded.

The third objection, and which relates especially to the application for which the test is wanted, is that phosphomolybdic acid, when brought into a solution of an extract, however the same may be acidulated with nitric acid, is decomposed, the green modification of molybdic oxyd being one of the products, which produces not only a green precipitate, but also a deep green, cloudy liquid in which no test-reaction can be observed with any degree of safety. The action of the saccharine or mucilaginous constituents of the extracts is in this case similar to that of most other deoxydising agents, but appears not to be overcome even by the presence of nitric acid.

For one purpose, however, and this is one of the applications I believe Mr. Hayes has made of the test, it may be valuable to the pharmacist; this is in determining, during displacement or extraction of a vegetable drug, the point of its exhaustion. In liquids containing but little extraneous organic matter, the reaction, after acidulating with nitric acid, shows itself distinctly enough; but in such where the organic non-nitrogenous matter preponderates, phosphomolybdic acid cannot be used, at least as a quantitative test. These we may presume are some, if not the principal reasons, why the test has not been further extended in its application.—*Proc. Am. Pharm. Association*, 1862.

ON CHESTNUT LEAVES IN WHOOPING-COUGH.

By GEORGE C. CLOSE, of Brooklyn, N. Y.

I wish to call the attention of members of the Association to an article, not recognized in the Pharmacopœia, and the use of which as a medicine has only recently come to my knowledge.

This article is the leaf of the common chestnut tree, (*Castanea vulgaris*.)

Having a child whom I supposed to be affected with incipient whooping-cough, I asked a prominent physician of New York, who has had an extensive practice for more than thirty years in the city, what he thought was the best remedy for whooping-cough? He answered, chestnut leaves are by far the best remedy I have ever met with. Upon this, I immediately commenced giving to the child an infusion of the leaves made with boiling water and sweetened with sugar. She drank it freely and without objection, the taste not being unpleasant. The cough, which had continued for two weeks, and was evidently growing worse previous to giving the remedy, was immediately relieved, and after two or three days ceased entirely, and has not returned though several months have passed.

Since making this trial, when asked by customers, "What is good for whooping-cough?" I have advised them, if they had no physician in attendance, to try the leaves. In several instances after trying them, they have reported to me that "they acted like a charm," and gave immediate and great relief.

I have also heard of cases of adults, who were affected with that kind of spasmodic cough, which is sometimes caused by some (perhaps slight) source of irritation in the throat, being immediately relieved by the same remedy.

As I have, occasionally, calls for chestnut leaves, I asked a person who applied for them a few days since, for what purpose he used them? He replied, as a remedy for whooping-cough, for which they were very good, and that they often relieved other kinds of cough also. This shows that their use is becoming somewhat popular as a domestic remedy.

A very extensive use of an article is required, however, to test its real value as a remedy, and I only present the foregoing facts as warranting, in my judgment, farther trials of the leaves.

I also present a specimen of the dried leaves procured green and cured by myself, and a sample of fluid extract made from the powdered leaves in the usual way, using diluted alcohol as a menstruum.

Although the use of chestnut leaves as a remedy is new to me,

it may not be to all the members present, and if any of them can give further information upon the subject, I hope they will do so for the benefit of the Association.—*Proc. Am. Pharm. Association*, 1862.

ON THE ACTION OF SELENIC ACID ON ALCOHOL.

By M. CHR. FABIAN.

By evaporating a weak solution of selenic acid, and raising the temperature to 265° , an acid is obtained containing about 83 per cent. of anhydrous selenic acid. In presence of concentrated sulphuric acid *in vacuo*, the density of the acid can be raised to 85 per cent. of anhydrous acid. Monohydrated acid contains 87.7 per cent of it.

Selenic acid concentrated *in vacuo*, and put in contact with its weight of absolute alcohol, becomes strongly heated. By raising the temperature ether is distilled, and at 169° C. reaction occurs, and the apparatus becomes filled with a dark green gas which condenses into white prisms of selenious acid. The other products of this reaction are formic acid, carbonic acid, oxide of carbon, aldehyde, and a small quantity of acetic acid.

Ethylselenic acid is obtained by heating for a certain time at 100° C. equal parts of selenic acid, and alcohol, diluting with an equal quantity of water, saturating with carbonate of lead, filtering, evaporating to one half, *in vacuo*, and precipitating the lead by selenic acid, and then by sulphuretted hydrogen. The ethylselenic acid obtained in this way cannot be concentrated without decomposition. Left to itself, it rapidly separates into selenic acid and alcohol.

Ethylseleniates are also unstable. They are all very soluble in water, less so in alcohol, and insoluble in ether. They are isomorphous with the corresponding ethylsulphates, with which, mixed in every proportion, they crystallize.

The author has prepared salts of potash, baryta, strontia, lime, lead, copper, and silver.—*Chem. News*, October 4th, 1862, from *Annalen der Chemie und Pharmacie*.

PURITY OF FROZEN WATER.

M. Robinet has made a variety of experiments to ascertain how water is freed from saline impurities by congelation; and his results go to show that the small amount of lime and magnesian salts in potable waters is forced out in the act of freezing as completely as the more soluble salts present in sea water. Frozen water, he says, is so far purified that it may, in most cases, be used for chemical purposes in place of distilled water. In reference to this, M. Martens adds, that in his photographic excursions among the Alps he found that he could always use the waters from the glaciers instead of distilled water, but that dissolved snow did not answer.

Dr. Rudorff has also made experiments on the freezing of saline solutions (*Bericht. d. Akad. der Wissensch. zu Berlin*, 1862, s. 163.) He employed the platino-cyanide of magnesium, the solution of which is colorless; but he found that when the solution was frozen so far that the water left was not enough to hold the salt dissolved, crystals of the well known beautiful appearance were formed. Other curious results were observed with a supersaturated solution of sulphate of soda. When such a solution was cooled below the freezing point and the formation of ice prevented, it was found that a piece of ice dropped in determined the formation of ice, while a crystal of the salt caused the formation of crystals of the salt. A very small piece of the salt dropped in with ice caused the separation of the whole of the salt. He noticed, too, that the lowering of the temperature produced an alteration in the constitution of the solution. For instance, when a solution of the blue salt, $\text{CuCl} + 12\text{HO}$, was frozen, the unfrozen water contained the green salt, $\text{CuCl} \times 4\text{HO}$. Other curious results will be found in the paper referred to.—*Chem. News, London, Oct. 4, 1862.*

ALBUMINATE OF IRON AND SODA AS A THERAPEUTIC AGENT.

By ANGELICO FABBRI.

Simple contact, at the ordinary temperature of the atmosphere, of white of egg with a salt of iron and soda, is capable

of instantly producing a soluble albuminate of iron and soda, or an albuminferrate of the alkaline base. The chemical combination of this compound is such that it is not altered by the yellow ferrocyanide of potassium, the most delicate test of the salts of iron, unless a few drops of acid—as, for example, the hydrochloric—be previously added to the soluble albuminate; thus proving that this decomposition cannot be effected by the agency of the alkalies, but only by some acids, since the potassium of the cyanide is not able to displace the oxide of iron, becoming oxidized at its expense, and setting the metal free, as occurs with the other ferruginous preparations. Considering that we find in the blood, albumen, soda in excess, and iron, and having shown how these three bodies, by simple direct contact, form a soluble salt, the chemical combination of which is so powerful that it is not destroyed by the most delicate reagent, may we not fairly infer that the iron exists in the blood as an albuminate of iron and soda: and would it not therefore be reasonable to administer iron in the various diseases in which it is prescribed, principally in reference to the state of the sanguineous system, in the form of albuminate, as that in which nature itself has placed it within our organism—one of the products, so to speak, on which our life depends. When I read in works of chemistry that the yellow ferrocyanide of potassium is not capable of demonstrating the presence of iron in the blood until a stream of chlorine has first been passed through the latter to destroy its coloring matter, I am confirmed in the opinion that the iron exists in that fluid as an albuminate of iron and soda, because this salt, requiring the addition of an acid to render it capable of detection by the cyanide, is supplied with it by the chlorine, which, in destroying the organic coloring matter becomes converted into hydrochloric acid by uniting with their hydrogen. Physicians have been long puzzled, and are still at a loss, how to administer iron, a most valuable remedy, in the manner most suitable to the internal organism; hence the great number of preparations of this metal. Some object to its saline combination with mineral acid on the ground that these are inorganic, and they prefer giving it in the metallic or oxidised state, leaving the acids of the stomach to form with it compounds which may be carried into the circulation. Others, un-

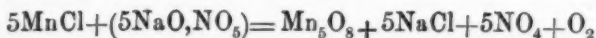
willing to run the risk of having the greater part of the iron—little or not at all acted upon—expelled with the feces, prescribe it in the saline state, but combined with organic vegetable acids, hence we have the malate, tannate, citrate, &c., of iron. Others still more scrupulous, wish to have it united to acids of an animal nature, and prefer the lactate, the cyanide, &c., and I, going still farther, would recommend its employment in the state of albuminate of iron and soda, requesting physicians to take into consideration what I have advanced, and to ascertain if practice will in this instance corroborate theory.

In preparing the albuminate of iron and soda, I employed the following process: Take 112 grs. of caustic soda, and 104 of sulphate of iron. Having dissolved both in a sufficient quantity of distilled water, let the solutions be poured on the whites of four eggs previously beaten up; let all now be shaken together and poured upon a filter to separate the hydrated oxide of iron which has precipitated, since all the iron is not in this case converted into albuminate. To the filtered liquid, which now contains, in addition to the albuminate, sulphate of soda, formed by the decomposition of sulphate of iron by the soda present in excess, lime water is to be added, to decompose the sulphate of soda, by which an insoluble sulphate of lime is precipitated. To separate the latter, the mixture is to be again filtered; and as the filtered fluid will contain an excess of lime, it is to be subjected to the action of a stream of carbonic acid, care being taken to avoid using an excess of the latter, and again filter to get rid of the insoluble carbonate of lime thus formed. The filtered fluid is now to be allowed to evaporate in a wide, shallow vessel, and with the aid of the heat of a stove, until it is reduced to a pint. A clear orange yellow, slightly saltish, chalybeate solution is thus obtained, which, as already mentioned, does not give a precipitate with ferrocyanide of potassium without the addition of an acid. Each ounce of this liquid contains, approximately, four grains of the albuminate, *plus* an excess of albumen and soda, as may be seen by referring to the process employed; the solution consequently has a slightly alkaline reaction. It is desirable that the soda should thus be present in excess in order that the compound shall be conformable to the state in which it exists in the blood, where

we find the albumen rendered alkaline by an excess of soda. This albuminate of iron and soda is represented by the following formula : $C^{30} H^{50} O^{10} + HO + Fe^2O^3 + NaO + 2HO = AL, Fe^2O^3, NaO + 2HO$ water. As the albumen loses a portion of its nitrogen in order to be converted into albumic acid, we must suppose that a portion of the soda by its presence determines the formation of a fatty matter at the expense of other principles of the same albumen, and then becomes saponified. I have given the formula of the albuminate of iron and soda above, neglecting the excess of the albumen, which though united to the liquid, perhaps with some other soluble salts of the albumen of the egg, (chlorides,) I do not consider to form a part of the saline compound, which may be obtained in radiated crystals by evaporating the solution to dryness.—*Journal of Rational Medicine*, May, 1862.

NEW PROCESS FOR THE MANUFACTURE OF NITRIC ACID.

M. F. Kuhlman *filis* has recently shown that when nitrate of soda is heated with chloride of manganese, a mixture of nitrous acid and oxygen is disengaged, which, by passing through water, furnishes nitric acid; while common salt and a high oxide of manganese are at the same time formed. The decomposition of the two salts commences at a temperature at about 230° Cent., and that the heat has to be carefully maintained at that point. The reaction which then occurs may be thus expressed :



The oxide of manganese produced may be regarded as a compound of $3MnO_2$ with $2MnO$.

The two salts are heated in a stone retort, and the mixture of peroxide of nitrogen and oxygen is passed through water contained in a series of vessels. The nitric acid is formed when the gases are brought into contact with the water, some binoxide of nitrogen being at the same time evolved, due to the excess of nitrous acid splitting up into nitric acid and nitric oxide. This binoxide coming into contact with the air in the condensing vessels, takes fresh oxygen, and is again absorbed. It

is important, therefore, to avoid loss, to maintain a sufficient quantity of air in the arrangement.

M. Kuhlman has found, as the mean of a great number of operations, that 100 parts of nitrate of soda will furnish 125 to 126 parts of nitric acid of 35° strength. This yield closely approaches to that obtained by the ordinary process (127 to 128 per cent.) The oxide of manganese remaining after the reaction may be used for the generation of chlorine, by which it is again converted into chloride of manganese suitable for another operation.

Other chlorides, such as those of calcium magnesium, or zinc, are also capable of very definite decomposition by means of nitrate of soda; chloride of sodium and an oxide of the metal being formed.

Sulphate of manganese also decomposes the nitrate, yielding the same product as the chlorine, excepting that sulphate of soda replaces the common salt. The yield of nitric acid is practically the same. The reaction will also take place with sulphate of lime, but a high temperature is required; one hundred parts of nitrate of soda yielding by this treatment ninety parts of nitric acid of 35°. The residue consists of a mixture of sulphate of soda and lime.

M. Woehler had previously indicated that a mixture of binocide of manganese and nitrate of soda when moderately heated, furnish no manganate, but a large quantity of caustic soda; and even recommended the reaction as suitable for the preparation of caustic soda. M. Kuhlman has applied it to the manufacture of nitric acid. He finds the yield to be about the same as that obtained by the plaster of Paris method.—*Lond. Pharm. Journ.*, Oct., 1862.

ESTIMATION OF TARTARIC ACID.

The determination of the amount of tartaric acid contained in the mother-liquors from which it is prepared, offers to the manufacturer certain difficulties, on account of the number of foreign bodies with which it is mixed. M. Guido Schnister, having remarked that the acid tartrate of potash is almost insoluble in citric acid, has founded upon this property a method for the estimation of tartaric acid.

These mother-liquors ordinarily contain iron, alumina, magnesia, sulphuric acid, etc., and tartaric acid. To determine the amount of this last acid, the liquid is saturated with caustic potash or pure carbonate of potash, filtered to separate the metallic oxides which are precipitated, and an excess of citric acid added. The acid tartrate of potash is collected on a filter, washed with alcohol and weighed. One hundred parts of cream of tartar correspond to 79.9 of tartaric acid. The author has verified this process by several trials, and obtained correct results.—*Lond. Pharm. Journ.*, Oct., 1862.

ON THE ACTIVE PRINCIPLES OF VERATRUM VIRIDE.

By G. J. SCATTERGOOD, of Philadelphia.

“Is the sedative action of *Veratrum Viride* due to the veratria known to exist in it, or is there another principle contained in the root to which the action is due?”

In order to decide this question I have attempted to isolate the active principles of the root, and to try their effects separately upon the animal system.

These appear to be, Firstly: Veratria. Secondly: An alcoholic resin.

They are obtained in the following manner: The finely ground root is exhausted by the smallest possible quantity of strong alcohol. This tincture is slowly poured into a larger bulk of water, and the mixture exposed to a gentle heat to drive off the alcohol. When this is done, the liquid is raised to the boiling point, and immediately filtered. The resin remains in the filter, while the veratria which appears to exist in this drug in a form soluble in boiling water, is found in the filtrate, from which it may be precipitated by the addition of ammonia. The alkaloid thus obtained is contaminated by another substance of a similar nature to veratria, but insoluble in ether, from which it may be separated by treatment with that menstruum, the veratria being left upon its evaporation, of a yellowish color—requiring further purification. The other substance remains in the residue, and may be extracted from it and obtained in the form of a brownish adhesive mass, by the action of strong alcohol. It is somewhat

soluble in water, but precipitated from its aqueous solution by muriatic acid. This solution froths considerably when shaken: Sulphuric acid is colored orange yellow by it. Muriatic acid a delicate red. It appears to be a compound of ammonia with one of the organic acids derived from the root. Its medicinal effects were not examined.

The medicinal properties of the two active principles before alluded to have been tested principally by experiments upon dogs. In this part of the examination I have been very much assisted by Dr. Saml. R. Percy, of New York, who has kindly tried several experiments at my request, and furnished me with a detailed account of them. As this shows the effects of these two articles in a form very suitable for comparison, it is here subjoined without much abridgement.

Exp. 1. One-third of a grain of veratria prepared from the Veratrum Viride was given to a large dog weighing about 30 lbs. in gelatine capsules, care being taken that none of it escaped.

At 3:35 P. M., pulse 150. 4:00 P. M. salivation very profuse, pulse 148. 4:05, vomiting produced. 4:20, vomiting continues very frequently, pulse 140. 4:45, vomiting viscid mucus and bile, pulse 128. 5:20, prostration very great, unable to stand, pulse 122. 5:45, pupils widely dilated, eyes fixed, pulse 122. 6:00, prostration great, profuse salivation, pulse intermittent. 9:00, walking about, but very sober and dejected, pulse 112.

Three days afterwards the same dose was repeated to this dog, with very similar results. The pulse was not much depressed, the prostration was very great, and there was almost total loss of power in the voluntary muscles.

Exp. 2. To a dog weighing 20 lbs. $1\frac{1}{2}$ grain of the resin dissolved in alcohol was administered. At 11 A. M., pulse 144. At 12, salivation produced, pulse 124. 12:20 P. M., pulse 96. 12:25, vomited many times, the vomited matter being viscid and ropy, pulse 80. 12:50, pulse 80. 1:10, pulse 74. 1:40, profuse diuresis, no dilatation of pupils, pulse 70. 3:35, P. M. quiet, pulse 40.

Exp. 3. Half a fluid dram of the tincture of the resin of Veratrum Viride, containing one and a half grains, was thrown by hypodermic injection into the side of a large dog weighing about

30 lbs. at 11·45 A. M., pulse 165. 11·56, saliva flows freely, purged, restless, pulse 106. 12·05 P. M., vomiting frequently viscid mucus and bile 12·15, purged again, vomiting, pulse, 60. 12·30, pupils widely dilated, vomited clear bile, pulse 52. 12·40, made an incision down to the femoral vein to which he made no resistance and seemed to be unconscious of pain, pulse 41. 12·44, injected 20 minims into femoral vein, death was almost instantaneous. Both sides of the heart were full of bright chocolate colored blood; the liver was gorged with dark blood, mucus coat of the stomach was greatly congested, the other organs were healthy.

Exp. 4. Half a fluid dram of the tincture of the resin Veratrum Viride containing one and a half grains, was thrown into the stomach of a dog weighing about 25 lbs. at 11·15 A. M., pulse 140. 12·10 P. M., additional 20 minims were given, equivalent to one grain of the resin, pulse 117. 12·20, free salivation, pulse 110. 1·00, vomited many times in quick succession, the matter last thrown up being tough and ropy, and containing mucus and much bile, the vomiting was painful and prostrating, pulse 80. 1·15, pupils fixed, pulse 76. 1·45, profuse diuresis, and salivation, pulse 72. 1·47, vomiting mucus and bile, pulse 72. 3·30, sleeping, pulse 70.

The foregoing experiments upon dogs of about the same weight indicate a very great similarity in the general therapeutic properties of the alkaloid and the resin. In each of these cases a great increase of the saliva, prolonged emesis, general prostration and reduction of the pulse were produced; and in every case but one dilatation of the pupils also. But it will be noticed that this reduction of the pulse, was much greater in those cases when the resin had been administered, than in that in which the alkaloid was given. In the former being from 165 to 41; from 144 to 40; and from 140 to 70; while in the latter it was reduced from 150 only to 112. In another instance in which the same alkaloid prepared by Dr. Percy, by purifying the commercial veratria, was administered in the dose of one-third of a grain, to a dog weighing 25 lbs., the pulse was likewise only moderately reduced, viz: from 132 to 100, the attendant effects being very much the same as those just described.

Judging from these parallel experiments, and from the fact that the resin exists in very much larger quantity, than the alkaloid, in this drug, it would appear that the sedative action of *Veratrum Viride* is due in greater degree to the alcoholic resin it contains than to its veratria.

I may add that the action of the resin upon the human system produces results very similar to those just described. On the 14th inst. at 5-15 P. M., I took two grains of the alcoholic resin. Pulse 80. At 6-45, its effects were first apparent in slight spasmodic contractions of the muscles of the leg—these soon passed off and were not afterwards noticed. At 7-45, free vomiting began, accompanied with an increased flow of saliva and general perspiration; the vomiting continued at intervals for upwards of an hour, and until considerable bile had been thrown up; and was followed by painful retching: at 8-45, pulse 60—by this time the feeling of warmth had been succeeded by general coldness of the body and loss of strength. At 9-15, pulse 55. At 9-30 fell asleep. The only effects observed in the morning were general weakness, and a somewhat depressed pulse. No tingling of the skin so frequently occasioned by veratria, nor catharsis, were produced.

The resin thus experimented with is of a soft consistence, and of a mild, oily, though nauseous taste at first, but leaving after some time a somewhat acrid sensation in the fauces. It is of a brownish-black color. It yields to ether its more oily portion, about one-quarter its weight,—the remainder, insoluble in that menstruum, is left of a harder and more friable consistence. In order to remove any suspicion that the medicinal action of the resin was due to a minute quantity of the alkaloid remaining in it, I administered three-quarters of a grain of the residue left after treating the alcoholic resin with ether, (which would have removed any veratria if present,) to a half grown cat. Its effects were very similar to those of the alcoholic resin before mentioned, vomiting, dilatation of the pupils, slight spasms of the muscles, slow breathing, and reduction of the pulse from the neighborhood of 100 to 42, were produced in the course of a few hours.

The quantity of resin obtained from 1 lb. avoirdupois of the dried root of *Veratrum Viride* may be stated at about 300 grains—of vera-

tria about 30 grains. From its reaction with sulphuric acid, the tinct. iodine test, and a solution of the iodo-hydrargyrate of potassium, I am of the opinion that it may perhaps be an altered form of veratria. I have not succeeded in detecting the presence of sabadillia. The existence of jervia in the filtrate from which the veratria was precipitated, was thought probable from the white precipitate which was produced in it upon the addition of sulphuric acid.—*Proc. Am. Pharm. Association*, 1862.

RENNET WINE.

Dr. Geo. Ellis states (*Dublin Med. Press*, July 16, 1862) that about two years since, having failed to obtain benefit from the preparation called pepsin, he had recourse to the direct preparation of a solution of gastric juice from the calf's stomach, and with the most satisfactory results. His mode of preparing is as follows: "Take the stomach, or rennet bag as it is called, of a calf fresh from the butcher; cut off about three inches of the upper or cardiac extremity, which portion, as it contains fewer glandular follicles, may be thrown away; slit up the stomach longitudinally; wipe it gently with a dry napkin, taking care to remove as little of the clean mucus as possible; then cut it into small pieces (the smaller the better), and put all into a common wine bottle; fill up the bottle with good sherry, and let it remain corked for three weeks. At the end of this time it is fit for use.

"*Dose*.—One teaspoonful in a wineglassful of water immediately after meals.

"*Test of Quality*.—One teaspoonful will solidify, to the consistency of blanchmange, in from one to two minutes, a cup of milk (about eight ounces) at the temperature of 100° Fahr.

"In this action on the casein of the milk, it may be said that the wine itself might have some effect. This, however, cannot be the case, as wine will not solidify milk, and it will only curdle it at a much higher temperature, and in larger proportion.

A single dose of this preparation, which Dr. E. calls rennet wine, given daily after dinner, will, he says, "be found quite sufficient to act speedily and effectively, without other treatment,

in the common run of cases of functional disorder of the stomach. It is not, perhaps, easy to explain the operation of this small quantity when we consider the large supply of the gastric secretion required for the thorough digestion of an ordinary meal. The action is probably due to those indirect chemical changes called catalytic transformations, which some organic substances, by their mere presence and contact, induce in each other, and in other proximate principles. Thus the conversion of a small portion of food in the stomach into healthy albuminose by this small quantity of sound gastric juice, may induce the same healthy action throughout the stomach contents during the entire process of stomach digestion. It is at least equally difficult to explain the action and rapid extension of ferments generally in their appropriate solutions. I have often been forcibly struck by the material effect of this small dose in removing offensive odor from the breath of young persons—a distressing symptom sometimes aggravated rather than relieved by purgative medicine; and I may also mention that in one of these cases cod-liver oil was easily tolerated afterwards, though never before.”—*Am. Jour. Med. Sci.*

CASE OF POISONING FROM THE POLLEN OF THE
COMMON YELLOW TIGER LILY.

Dr. Jeffries Wyman read the following report of a case by Dr. R. T. Warren, of Waltham, Mass.:

“Mrs. B. was making a call at a neighbor's, having with her a little daughter 4 years old. The child was ‘perfectly well,’ the mother said, and had been so. It played with another little girl, and did not go out of the room during the call. The little girl came to Mrs. B., requesting her to go and see Fanny, the name of the child. Mrs. B. went, and found Fanny rubbing her nose very violently. Soon there was a profuse discharge of mucus from the nose, colored yellow. The mother questioned the child, and ascertained that she had reached her hand out of the window, taken an anther from a tiger lily, and passed it into the right nostril. The child pointed out the lily, and the mother found just one anther missing. Mrs. B. was particular in her inquiries, and the child was positive in stating what she had done. Vomiting soon followed the discharge of mucus from

the nose. This consisted at first of chyme, having no appearance of undigested food, and was followed by vomiting of mucus, colored yellow, the same as the discharge from the nose. The child then wanted to go to sleep. The mother took her home, and then sent for me. I saw her at 6, P. M., Wednesday, August 13th, about one hour after the anther was passed into the nose. The child appeared sleepy, but was easily roused, and was intelligent. Vomiting of mucus tinged yellow occurred while I was present. The yellowness did not seem to be caused by bile. The symptoms did not seem at all alarming. Not aware that the tiger lily possessed any poisonous properties, I felt no anxiety, and went away, after prescribing remedies, requesting to be called if anything new occurred. I was sent for about 10 P. M., four hours afterwards. Evacuations of the bowels had occurred; at first of natural appearance, then followed discharges colored yellow, the same as the vomiting and the discharge from the nose, and at last bloody discharges. The vomiting had occurred occasionally, and this at last became bloody. The child was dull, sleepy and languid. I prescribed astringents, opiates in the form of paregoric, and brandy and water, if the languor should increase. I saw her Thursday morning. A dejection, quite bloody, occurred between 1 and 2 o'clock, A. M., and after that the dejections were checked. She was relieved of the vomiting. The child seemed languid, rather sleepy; no wandering. The eyes had a dull, reddish injection. At 4 P. M., same day, appearance of the child much the same as in the morning. The right nostril was nearly closed; membrane of both nostrils very pale. Some discharge of clear, thin mucus. Friday morning.—The child looked brighter. Some reddish injection of the eyes. No urine had been passed during the last twenty four hours. Slight feverish symptoms. No delirium. 7 P. M., Friday.—No urine had been passed. Several dejections, dark colored, very offensive. Some fever during the day, slight delirium and startings. Some nausea. Was called to her about 1 o'clock, Saturday morning. Shortly before, she had a large, dark colored, very offensive discharge, and immediately began to sink. She died a little before 4 o'clock, about fifty-nine hours after passing the anther into the nostril."—*Bost. Med. and Surg. Journ.*, Nov. 6th, 1862.

THE FETID ODOR OF THE SKUNK.

(*Mephitis Americana* L., *M. mesomelas* Licht.)

Both sexes of this animal possess certain glandular sacs near the lower extremity of the intestinal canal, which secrete a yellow oil possessing that well known odor of the skunk. Lassaigne, who first examined the oil, states that it consists of a fatty and a volatile oil, the latter containing 8 p. c. of sulphur. Dr. Swartz (*Annalen der Chemie u. Pharmacie*, vol. cxxiii., p. 267) had procured a quantity of the oil and three of the small glands from New York, and examined the same in Woehler's laboratory.

The glands, of about the size of a walnut, were first distilled with water. A colorless oil passed over, having the unpleasant order of organic sulphides: it floated on cold, but sank in hot water, and when lighted burned with a blue flame evolving sulphurous acid. Various circumstances render it more than probable that it consists of at least two different volatile ingredients, the separation of which was impossible from the small quantity of material on hand. The oil contained 16 p. c. of sulphur.

The oil obtained from New York was of a dark yellow color, limpid, and of a very offensive odor, resembling that of compounds of allyle, but different from that of the oil distilled from the glands. Subjected to fractional distillation it gave between 221° and 230° F. a colorless liquid oil possessing a penetrating odor like mercaptan. The thermometer then rapidly rose to 374° to 392° F., when a thicker oil of a yellow color came over, the odor of which was nearer that of the oil from the sac. On distilling the residue afterwards with water an oil passed over which appeared to be identical with the oil distilled from the glands, so that it would almost appear as if the same had once been subjected to distillation. The thicker oil also contained a considerable proportion of sulphur.

The water which came over with the oil possessed a strong odor, and the property of precipitating the solutions of metals. On being left in contact for some time with hydrated oxyde of lead, the odor undergoes an essential change, sulphide of lead

being formed at the same time. The liquid filtered from the latter gives a white precipitate with mercuric chloride, which precipitate was decomposed by sulphuretted hydrogen, being decomposed into sulphide of mercury and the chloride of an alkaloid, crystallising in fine, very deliquescent prisms possessing a burning taste. The platinum salt is soluble in boiling water, and crystallises out on cooling; the same takes place with gold salt. The base itself is volatile, and is formed when the chloride is distilled with oxide of silver; the chloride itself is volatile also. The oil of the skunk appears to possess a decided action on the urinary organs. Dr. Swartz, while distilling the glands was taken with violent headache and dysuria; the urine passed with scalding and had the odor of musk, and it deposited a brown substance of the same odor. He also continued to transpire for several days the foetid odor of the oil.—*Druggists' Circular*, December, 1862.

AMYLOGEN.

Amylogen is a starch which has been rendered soluble without undergoing any chemical change, that is, it is starch in the state in which it fills the starch granules or cells. Flückiger (*Schweizer Zeitschrift für Pharmacie*, v. p. 185) prepares it not by the troublesome process of trituration with sand, as has been done by Jessen and Delffs, but simply by digestion in a solution of neutral chloride of calcium. One part by weight of the starch, (whether from potatoes, wheat, tapioca, arrow-root, or that from the rhizome of *Nephradium Filix mas*,) is macerated for two or three days in ten to twenty times its weight of solution of chloride of calcium, being frequently shaken during that time. It is then mixed with from 100 to 150 times the bulk of water, with which it forms a stiff jelly, from which either at once or by further dilution with water, a solution of amylogen (together with chloride of calcium) can be separated by filtration. It retains for more than two weeks the property of turning blue with iodine.

On adding alcohol to the solution, amylogen is precipitated in the form of white flakes, which after removing from the liquid,

appear like coagulated albumen. By repeated washing with alcohol it is obtained entirely free from calcium. It dries in the air to transparent colorless lumps, which, when placed over oil of vitriol, lose 10 p. c. of water, but takes it up again when afterwards exposed to the air. It resembles very much white gum arabic, but is more horny, tough, and more difficult to powder. When dried over sulphuric acid it has a specific gravity of 1.475. As long as it is yet moist amylogen dissolves readily and completely in water, but when once dried it loses that property, even towards boiling water, nor does chloride of calcium then produce a solution. The cellular membrane of the starch appears to protect this substance, not only from being dissolved in water, but also from passing into the insoluble condition.—*Druggists' Circular*, December, 1862.

APIOL.

In the year 1849 the Society of Pharmacy of Paris proposed for competition the following inquiry:—To discover a means of artificially preparing Quinine, that is, without the employment of Cinchona Bark, or any substance containing quinine ready formed. In default of this, to make known a new organic product, natural or artificial, possessing [medicinal] properties equivalent to quinine, and which would be capable of competing commercially with it.

Nine memoirs, professing to reply to this inquiry, were addressed to the Society, among the number being one by Drs. Joret and Homolle, upon an alleged new febrifuge named by them *Apiol*. The memoir, although not completely resolving the question, and consequently not deemed worthy of the prize, was yet considered to deserve special encouragement, and an abstract of it, prepared by M. Dubail, appeared in the 'Journal de Pharmacie et de Chimie.' Tome xxviii. (1855) p. 212. From this abstract and from MM. Joret and Homolle's 'Memoire sur l'*Apiol*' (Paris, V. Masson, 1855, 8vo.) we gather the following facts.

That the febrifuge virtues of certain European umbelliferous plants, such as *Smyrniium Olusatrum* L., *Imperatoria Ostru-*

thium L., *Apium graveolens* L., *Phellandrium azuaticum* L. etc., have from time to time attracted the notice of physicians, and that even the juice and other preparations of common parsley (*Apium Petroselinum* L.) have been employed in cases of fever with more or less success. It was not, however, until the year 1847, that an accidental circumstance induced one of the authors to make some experiments upon the seeds of the last named plant, which experiments proved eminently encouraging. This led to a chemical examination, the results of which may be thus stated. Parsley seeds contain:—

1. A volatile oil.
2. A crystallizable solid fatty substance, fusible at 70° F.
3. Pectine (the *apiine* of Braconnot.)
4. Chlorophyll.
5. Tannin, yellow coloring matter, extractive woody matter, and inorganic salts.
6. A yellow, oily, non-volatile liquid, denser than water, having a peculiar taste and smell. This liquid to which the name of *apiol* was given was determined to be the principle to which exclusively the antiperiodic virtues of the seeds are due.

The method recommended for the preparation of *apiol* is the following;—Powdered parsley seeds are to be exhausted with alcohol of sp. gr. .890 to .864; the tincture obtained is to be treated with animal charcoal and then evaporated in a water-bath until three-fourths of the alcohol have been recovered. The residue is to be treated with ether or chloroform, and the solution so obtained is to be evaporated (finally by a stove heat) until all trace of either menstruum has been expelled. A liquid remains which is to be triturated with an eighth of its weight of litharge and then allowed to subside during forty-eight hours. Finally, it is to be filtered through a thin layer of charcoal, which will render it nearly colorless. The product so obtained is called *apiol*.

In this state *apiol* possesses the following properties: it has the peculiar and tenacious odor of parsley seeds, but not the terebinthinous smell of the essential oil; it has an acrid and pungent taste, especially felt in the fauces. Its density at 53° F. is 1.078; at 10° F. it becomes turbid, but without solidifying, regaining its transparency upon an elevation of temperature.

Heated to a temperature of from 300° to 350° F. it disengages some bubbles; at 428° F. it becomes colored without apparently any modification in odor and taste and without loss in weight; it is therefore not volatile. Burned upon a platinum slip, it leaves no fixed residue. It is insoluble in water, whether cold or hot, very soluble in alcohol of sp. gr. .934 to .834, and dissolves in all proportions in ether or chloroform. Chlorine does not sensibly alter either the odor or taste of apiol, but it produces in it a slight blackish precipitate. Potassium immersed in it, rapidly becomes covered with bubbles and disintegrates, indicating the presence of oxygen. Apiol contains no nitrogen. Treated with sulphuric acid, it behaves like copaiba, acquiring a beautiful red color, and solidifying with the loss of both odor and taste; it decomposes nitric acid violently, becoming converted into a yellowish resin. It has no action upon hydrochloric acid, but is completely soluble in acetic acid. It forms an emulsion with potash or soda; an ammoniacal emulsion exposed to the air loses its ammonia, the apiol regaining its original condition. An alcoholic solution of apiol slightly reddens litmus and syrup of violets. The same solution treated with an alcoholic solution of acetate of lead becomes turbid; the turbidity disappearing upon heating and reappearing as the liquid cools.

Drs. Joret and Homolle, says M. Dubail, consider that apiol is an immediate principle, allied in its nature to fixed oils. In its density it differs from analogous organic products; while most of the reactions which it produces with reagents are with the exception of that with acetate of lead purely negative.

Apiol is recommended as a powerful febrifuge; it may be administered in doses of five or six drops (two and a half or three grains) diffused through any bland liquid,* or in the form of capsules, four of which contain one gramme or fifteen and a half grains. In cases of intermittent fever, two to four capsules may be given daily in one dose five or six hours before the paroxysm. Apiol may also be prescribed in the form of a syrup prepared thus:—Apiol five parts, white sugar a thousand parts.

*The following is a good formula;—R. Apiol gr. v. Syrupi f3ij. Pulv. tragacanth co. ʒj. Aq. dest. ad f3xx. Misce. [Each fluidounce will contain two grains of apiol.—Ed. Ph. J.]

Mix together, and dissolve with a gentle heat in distilled water five hundred parts; filter and preserve for use. Of this syrup two and a half fluidounces contain only five grains: hence the necessity of a larger dose of sugar than would often be convenient.

According to Drs. Joret and Homolle, apiol has also been usefully employed as an emmenagogue in doses of three to five grains *per diem*, and has likewise proved beneficial in the night perspirations of phthisis.—*Lond. Pharm. Journ. December, 1862.*

ORIGIN OF ANACAHUITE WOOD.

BY DANIEL HANBURY, F.L.S.

It is now about two years since the name of this drug appeared in the German pharmaceutical journals, as a new remedy for consumption. Shortly subsequent to this period, large quantities of anacahuite wood were imported from Tampico, and extensive trials were made in Germany in order to determine whether the good effects which the wood was stated to produce in Mexico could be realized in Europe also. Chemical analysis was also resorted to in order to discover whether it possessed constituents that could in any way explain its alleged beneficial action. The results of all this labor were by no means favorable to the new drug; its valuable effects in phthisis could not be observed; analysis did not indicate that it possessed any important medicinal properties, and as a natural conclusion, anacahuite wood was thrown aside as a remedy of no value.

One question however remained, and that was: What plant is it which yields this drug? Upon this point until recently no information could be obtained. Dr. Otto Berg, of Berlin, Dr. Berthold Seeman of London, and myself, consulted all the authorities at our disposal, but without arriving at any positive conclusion. I also put myself in communication with Lieutenant Colonel Cumberlege, our Consul at Tampico, but his sudden death which occurred soon after prevented my deriving the information I hoped he would be able to afford. Dr. Seeman, however, made a fortunate suggestion; he pointed out, that according to Dr. Torrey, *Cordia Boissieri* A. De C. is called by

the Mexicans *Nacahuite*, a name sufficiently like *Anacahuite* to justify a suspicion of identity. This suspicion has been changed into certainty. In a recent number of *Flora*, occurs the following interesting notice which is republished in *Bonplandia* of 1st November last.

In the summer of 1861, the Botanical Garden of Gottingen received from Mr. Gresser, the Hanoverian Consul at Tampico, two stems of the Anacahuite-tree, which although in a very unpromising condition upon arrival, yet by suitable treatment soon threw out new shoots. They have now grown into strong shrubs, and last winter produced flower buds, the full development of which was however prevented by the unfavorable season. Mr. Gresser at a subsequent period, sent also dried leaves of the Anacahuite, and the fruit preserved in alcohol, which with the growing specimens, afforded data for determining the plant to be the *Cordia Boissieri* of Alphonse De Candolle, described in the 9th volume of the *Prodromus*, p. 478.

In the herbarium of Sir William J. Hooker of Kew, there are good specimens of *Cordia Boissieri*, from which, with the permission of Sir William, the opposite wood-cut has been made. [The figure is omitted here.]

Touching the properties of the natural order *Cordiaceæ* to which *Cordia* belongs, the remarks of Endlicher* are to the following effect. The pulp of the drupes is mucilaginous, viscid and astringent, with some sweetness; in a few it is acidulous; the fleshy cotyledons contain a bland oil. The saccharine fruits of *Cordia Myxa* L. a tree indigenous to tropical Asia, and cultivated in Egypt from a very remote period, were used by the ancients in coughs and other disorders of the respiratory organs on account of their soothing and laxative properties. In Europe they are now very rarely employed. The West Indian *Cordia Sebestena* L., has similar virtues. Of some members of the order the wood and leaves are resinous and aromatic. The brown wood, elegantly veined with black, of *Cordia Rumphii* Bl., has the odor of musk. The bark of *Cordia Myxa* L., is frequently used in astringent gargles in India, and the root is reputed to be laxative.—*Lond. Pharm. Journ.*, December, 1862.

*Enchiridion, p. 319.

ON THE DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

The Report of the Select Committee appointed to consider the practicability of adopting a simple and uniform system of weights and measures has just been published. The following recommendations are laid before the House, together with a great mass of evidence and tabular appendices: "1. That the use of the metric system be rendered legal. No compulsory measures should be resorted to until they are sanctioned by the general conviction of the public. 2. That a Department of Weights and Measures be established in connection with the Board of Trade. It would thus become subordinate to the Government, and responsible to Parliament. To it should be entrusted the conservation and verification of the standards, the superintendence of inspectors and the general duties incident to such a department. It should also take such measures as may, from time to time, promote the use and extend the knowledge of the metric system in the departments of Government and among the people. 3. The Government should sanction the use of the metric system (together with our present one) in the levying of the Customs' duties; thus familiarizing it among our merchants and manufacturers, and giving facilities to foreign traders in their dealings with this country. Its use, combined with that of our own system, in Government contracts has also been suggested. 4. The metric system should form one of the subjects of examination in the competitive examinations of the Civil Service. 5. The gramme should be used as a weight for foreign letters and books at the Post Office. 6. The Committee of Council on Education should require the metric system to be taught (as might easily be done by means of tables and diagrams) in all schools receiving grants of public money. 7. In the public statistics of the country quantities should be expressed in terms of the metric system in juxtaposition with those of our own, as suggested by the International Statistical Congress. 8. In private bills before Parliament the use of the metric system should be allowed. 9. The only weights and measures in use should be the metric and imperial, until the metric has been generally adopted. 10. The proviso in the 5th

and 6th William IV, cap. 63, clause 6, allowing the use of 'local and customary measures' in cases where the vessel employed 'is not represented as containing any amount of imperial measure or of any fixed local or customary measure heretofore in use,' should be repealed as giving facilities to evade the statute. 11. The department which it is proposed to appoint should make an annual report to Parliament."—*Chem. News*, Sept. 13th, 1862.

POROUS WATER-PROOF CLOTH.

This quality is given to cloth by simply passing it through a hot solution of weak glue and alum. To apply it to the cloth, make up a weak solution of glue, and while it is hot add a piece of alum, about an ounce to two quarts, and then brush it over the surface of the cloth while it is hot, and it is afterwards dried. Cloth in pieces may be run through this solution, and then run out of it and dried. By adding a few pieces of soap to the glue the cloth will feel much softer. Goods in pieces may be run through a tubfull of weak glue, soap and alum, and squeezed between rollers. This would be a cheap and expeditious mode of preparing them. Woollen goods are prepared by brushing them with the above mixture, first in the inside, then with the grain or nap of the cloth, after which it is dried. It is best to dry this first in the air and then in a stove-room at a low heat, but allow the cloth to remain for a considerable time to expel the moisture completely. This kind of cloth, while it is sufficiently water-proof to keep out moisture and rain, being quite impervious to water, is pervious to the air. Many fishermen know that, by boiling their pants, jackets, nets and sails in a pot with oak bark and fish skins, and afterwards drying them, they become water-proof. The composition mentioned above is of nearly the same nature as the fish glue and oak bark, and consequently the same effects are produced. The composition is stated to be improved by adding about one-fourth the quantity of the sulphate of copper to the alum. Cloth made water-proof in this manner will resist the effects of water, even if it is somewhat warm, but it loses its water-proof properties if boiled.—*Lond. Chem. News*, Oct. 11th, 1862.

Editorial Department.

WEIGHTS AND MEASURES OF THE BRITISH PHARMACOPŒIA.—After much delay there seems to be a fair prospect that the British Pharmacopœia will be published. The cause of the delay has been of a two-fold character. 1st, because of the inability of the "General Medical Council" to take out a copyright without a special act of Parliament; and 2d, because, when the report of the Pharmacopœia Committee came before the Council, it was resolved, that so much of the report as related to weights and measures should be reconsidered. When the Council entered on this labor they had presented to them communications from their Executive Committee, from the Colleges of Physicians of London and Edinburgh, the Pharmacopœia Sub-Committees of London, Edinburgh and Dublin, and the Council of the Pharmaceutical Society in Edinburgh.

The Executive Committee doubted the expediency of changing the old weights, and wanted the opinions of Sir John Herschel and Prof. Miller.

The London College of Physicians did not object to introducing the avoirdupois pound, but opposed the new grain of Dr. Wilson, and wished the troy grain retained.

The Edinburgh College of Physicians considered the old Apothecary's weight to be unsatisfactory, and the proposed change of the Pharmacopœia Committee to be an improvement, but approved of the Medical Council "at once taking the lead in inaugurating the decimal system, by introducing it into the new Pharmacopœia."

The London Sub-Committee abandons the new grain, opposes the metrical system, advises waiting, and not at this time making a change, as two out of the three Pharmacopœias now use troy weight; and lastly, they admit that the return to the troy weight will involve a very extensive revision of the manuscript of the British Pharmacopœia.

The Edinburgh Sub-Committee justify and uphold the weights as adopted in the original report, "as the only eligible mode of reconciling real existing discrepancies, and getting rid of actual serious inconvenience." At the same time they will hail with pleasure the introduction of the decimal system, when science, trade, and government can agree on its introduction.

The Dublin Sub-Committee fully agreed with that of Edinburgh. The Council of the Pharmaceutical Society in Edinburgh advocated the avoirdupois weight of the report.

With these views before them, the General Council considered the subject, and after negating a motion to introduce the French decimal weights, and also a motion to have only the Avoirdupois pound and the Troy grain and its multiples, they finally resolved

"That the weights used in the British Pharmacopœia be the Imperial or Avoirdupois pound, ounce, and grain, and that the terms 'drachm' and 'scruple' as designating specific weights be discontinued."

It follows, therefore, only one kind of weights will be used in medicine, in the British Empire, and that the United States Pharmacopœia will stand alone in employing the Troy or Apothecary's weight.

ON THE SALE OF LIQUORS BY APOTHECARIES.—It is a subject of much annoyance that the revenue law is not rendered clear and unequivocal in its expressions. One of the chief sources of revenue is proposed to be the sale of liquors. Liquors are regularly sold by a special class of retail and wholesale dealers—but whilst the dealers have the general trade in liquors, the Apothecary is compelled to keep, and is expected to furnish the sick with French brandy, port wine, and sherry, because these are *medicines* in the official list of the National Pharmacopœia, and as such are as much a subject of legitimate sale for medicinal use as castor oil, oil of turpentine, or honey. Section 66 enacts that nothing contained in the preceding sections shall be construed to require a license from Apothecaries "as to wines or spirituous liquors which they use exclusively in the preparation or making up of medicines for sick, lame, or diseased persons." Is it to be understood from this that an apothecary who pays the Government a license for selling drugs and medicines as an apothecary, must pay it another license for the sale of two or three items in the list because these are the subject of a special license to special retail and wholesale dealers? Now, by far the majority of apothecaries do not sell as much brandy and wine in a year as would pay for the license, and yet they are bound to keep and sell these articles by their duty to physicians and the public. In a recent case, a Government official denied the right of an apothecary to furnish brandy even on the prescription of a physician, unless it was mixed with some other medicine. It is quite time that this matter was cleared up, and the real right and duty of the apothecary ascertained, when he strictly confines his sale of these articles to legitimate medicinal use, and requires in all cases, except when on a physician's prescription, that the purchaser should certify to that fact. Our own opinion would favor the entire exclusion of liquors from the shop, were it not in the line of duty to keep them.

THE NEW YORK COLLEGE OF PHARMACY.—In the present number we have two valuable original contributions to our pages, from Professors Maisch

and Mayer, of the New York College of Pharmacy. With so able a faculty we cannot doubt the success of the New York School of Pharmacy, if the pharmacutists of that large city can be properly awakened to the importance of the instruction to be obtained at its lecture hall. It is the interest of every apothecary to see that his assistants and apprentices get such theoretical instruction as they are not likely to get in the shop, because it enables them to correct errors, and get over practical difficulties in prescription dispensing, or in making preparations.

We are aware that much apathy exists in the mass of New York Pharmacutists in regard to aiding their young men in obtaining this instruction, by granting the time it requires from the shop; and this is a difficulty also met with here; but it is gradually being overcome. For the sake of the good fruits it will produce in pharmaceutical progress, we would urge our New York friends to build up their school on a broad and solid foundation, by giving it present encouragement and aid.

Proceedings of the American Pharmaceutical Association, at the Tenth Annual Meeting, held in Philadelphia, September, 1862, with the Constitution and Roll of Members. Philadelphia. Merrihew & Thompson, Printers, 1862. pp. 357, 8vo.

This volume made its appearance about the usual time, and in general aspect, as regards size and execution, corresponds well with its predecessors. About fifty pages are occupied with the Minutes, one hundred and forty by Mr. Maisch's Report on the Progress of Pharmacy, about fifty pages with the other original communications, and the balance with the roll of members, Constitution, and Mr. Wiegand's general Index to the first eight volumes, which last occupies forty-two pages.

The prominent feature of the book is Prof. Maisch's Report on the Progress of Pharmacy, which exhibits a systematic arrangement and classification of subjects not hitherto adopted in these reports, and renders it very easy of consultation; and from its extensive scope, it will prove a very valuable storehouse of facts for investigators. After some generalities relative to schools and the literature of Pharmacy, the Report enters on a detailed though concise statement of the various papers that have appeared on Practical Pharmacy, Materia Medica, Medicinal Chemicals, Inorganic Chemistry, Organic Chemistry, General Analysis, and Organic Analysis. The author comments on the points of value of the papers in a manner calculated to greatly aid research. The general expression of favor which this report has received, both from the Association collectively, and from individual opinion, has, we think, done only justice to the laborious and discriminating industry of the author.

Of the other papers, those of Prof. Mayer, of New York, on testing for

Alkaloids, Geo. J. Scattergood on *Veratrum Viride*, and Wm. S. Merrill on the Alkaloids of *Hydrastis*, are most worthy of remark. The all-absorbing influence of the rebellion exhibits its power in the failure of so many contributions to the Proceedings.

The general Index of Mr. Wiegand will prove to be very useful for reference to the back volumes of the Proceedings. It is only to be regretted that as it is published with the tenth volume that it should not have embraced all the volumes instead of eight. It would have imposed additional labor on Mr. Wiegand, but that accomplished has been done so well that it only makes the regret the greater that his report does not embrace all to the present inclusive.

In concluding our notice, we would direct the attention of members of the Association to the excellent remarks of the editor—Edward Parrish—in the prefatory note, pointing out matters for their consideration with a view to the next meeting, and for the future usefulness of the Association. In quality of execution and correctness we believe the book to be fully up to the volumes that have preceded it.

The action of Medicines in the System; or on the mode in which therapeutic agents introduced into the stomach produce their peculiar effects on the animal economy, being a prize essay, &c. By Frederick William Headland, M. D., B. A., F. L. S., &c., &c. Fourth American Edition, Philadelphia. Lindsay & Blakiston. 1863. pp. 448. Octavo.

Dr. Headland's work has been so long before the American medical public that any recommendation of it in this place would be a work of supererogation. With a subject clouded with so much mystery as that of "Action of Medicines in the System," no author can be expected to give mathematical accuracy of demonstration, yet few writers on this subject have kept closer to the inductive path that leads to ultimate success, and shown more acuteness in observation, than has our author.

The price of the volume is two dollars, and may be had of the publishers, South Sixth Street.

The Physician's Pocket Memorandum for 1863. By C. H. Cleveland, M. D. Cincinnati, Ohio.

Dr. Cleveland's book is favorably known by numerous practitioners. In this fourth edition many previous typographical errors are corrected, and some alterations made for the better. The usefulness of this form of memorandum book we have before testified to, and need only direct the attention of our medical readers to the fact of its readiness.

The Dentists' Memorandum : A Book of Engagements and Manual of Ready Reference for 1863. By C. H. Cleveland, M. D. Cincinnati. Bradley & Webb, printers, 1863.

This little volume is gotten up in the same style as the author's Memorandum addressed to Physicians. About thirty pages of letter-press are embodied, consisting of succinct notices on prominent points connected with dentistry, recipes of various kinds, and information for cases of emergency. It presents many conveniences, and certainly will greatly aid the dentist in conducting his business with regularity.

OBITUARY.—CHARLES T. CARNEY, the accomplished pharmacist and able chemist, of Boston, has closed his earthly career. About the middle of 1862 we first heard of his indisposition, when, as Chairman of an important committee of our National Association he signified his physical inability to furnish the report. From that time his indisposition increased, and, by the advice of his friends, he sought the air of Minnesota, at St. Paul's; but his disease (phthisis) had closed in on him too effectually to be overcome, and he rapidly sank into his rest in September last. We cannot but recall a few words of his own in the last report he made as Chairman of the Executive Committee of the Association. Speaking of the annual record of deceased members, he remarks: "It calls forth feelings of sympathy with those more nearly related to the deceased, as well as sober views for ourselves and our own future. We cannot hope to pass a single year now, as an Association, without having some record of death's doings to make at each annual meeting. Our numbers are so large and widely scattered, that it would be indeed remarkable if we have no losses to record. Let the fact that this *must* be not make us less hopeful for the future, but strengthen us in every faithful discharge of duty, feeling that however and whenever the summons comes, those who have done faithfully and well need feel no fear."

At a meeting of the Trustees of the Massachusetts College of Pharmacy, held on the 1st of October, a committee was appointed to communicate to the widow of the deceased a proper sense of their appreciation of the loss she had sustained. The Committee say of him: "Standing, as he did, at the head of our profession, having qualified himself by a life of severe self-devotion to study and research, possessing extraordinary ability as an instructor, he has left a vacancy which cannot be filled. He was the centre of our circle, beloved and respected by all, and his worth will remain the richest treasure of our memory."

An occasional intercourse during ten years nearly, enables us to coincide in this strong testimony to the virtues and ability of our late associate.

Catalogue of the Class of the Philadelphia College of Pharmacy.

FOR THE FORTY-SECOND SESSION, 1862-63.

With a List of their Preceptors and Localities.

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Armstrong, Wm. E.	Philadelphia,	"	T. Morris Perot.
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Berger, Christian	"	"	Charles Ellis & Co.
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Buse, Oliver	Philadelphia,	Pennsylvania,	C. H. Eggert,
Campbell, Hugh	"	"	J. Duntun.
Coggins, Franklin	"	"	Bullock & Crenshaw.
Cole, John W.	"	"	R. P. Thomas, M. D.
Combs, Matthew	"	"	Matthew Combs.
Cunningham, Jn. M.	"	"	Caleb R. Keeney.
Dilworth, J. B., M. D.	"	"	
Eldridge, Geo. W.	Haddonfield,	New Jersey,	H. N. Rittenhouse.
Evans, Joseph F.	Philadelphia,	Pennsylvania,	John Goodyear.
Evans, J. Estell	Woodbury,	New Jersey,	French & Richards.
Field, Byron G.		"	Wyeth and Bro.
Fox, Daniel S.	Reading,	Pennsylvania,	H. A. Bower.
Givens, M.	Philadelphia,	"	Wm. M. Reilly, M. D.
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Hoffmann, C. Ferdinand		Germany,	Bullock & Crenshaw.
Huber, Milton	Norristown,	Pennsylvania,	Wm. Stahler.
Jeannot, Geo. Edward	Locle,	Switzerland,	J. R. Anguey, M. D.
Jones, Edward C.	Philadelphia,	Pennsylvania,	A. H. Yarnall.
Jones, Samuel T.	Bordentown,	New Jersey,	Daniel S. Jones.
Kenworthy, James	Philadelphia,	Pennsylvania,	James T. Shien.
Kirkbride, Joseph C.	Camden,	New Jersey,	J. C. Delacour.

Lachenour, H. D., M. D.	Easton,	Pennsylvania,	
Laciar, Joseph	Bethlehem,	"	Phillip H. Horn.
Lehbach, P. Frederick	Newark,	New Jersey,	Wm. Wider.
Lineaweaver, K. C.		Pennsylvania,	Wm. Hodgson, Jr.
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McElroy, A. C.		New Jersey,	Charles Ellis & Co.
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Milke, Wm.	"	"	E. Herwig.
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Moore, Joseph E.	"	"	James L. Bispham,
Morand, Henry M. F.		France,	Daniel Hershey, M. D.
Morell, Elijah S.	Philadelphia,	Pennsylvania,	U. S. Hosp. W. Philad.
Morris, Henry R.	"	"	Jenks & Middleton.
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Ruan, James	"	"	Geo. M. Snowden.
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Segner, William	Palmyra,	Pennsylvania,	J. P. Fidler.
Shallcross, Aaron P.		Ohio,	E. Parrish.
Shivers, Charles, Jr.	Philadelphia,	Pennsylvania,	Charles Shivers.
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Thomas, Jason P.	Tamaqua,	"	H. C. Blair.
Tilge, F. A.	Philadelphia,	"	Frederick Brown.
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Weber, Henry J.	Pottsville,	Pennsylvania,	Hassard & Co.
Weber, Wm. A.	Philadelphia,	"	J. Weber, M. D.
Wilson, G. Banks	"	"	Charles Eberle.
Wilson, Walter H.	"	"	Alfred Tatem.